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About Our CONTRIBUTORS

TRAVIS E. KALLENBACH, D.D.S. is a graduate of the Chicago College of Dental Surgery of the class of 1926. Although a general practitioner, Doctor Kallenbach's major interest for twelve years has been in the field of temporomandibular articulation. Last month the first installment of FACTORS IN CORRECTING JAW POSITION RELATIVE TO THE ABNORMAL TEMPOROMANDIBULAR JOINT discussed primarily the anatomy. A full-page color chart illustrated the anatomy of this joint. Readers are urged to refer to that chart as they continue the article in this issue.

I. S. MILLER, D.D.S. (University of Pennsylvania, 1909) has contributed numerous articles to dental periodicals but this is his first appearance in THE DENTAL DIGEST since it was reorganized in 1932. Doctor Miller's practice is limited primarily to periodontia.

JAMES S. MILLER, although appearing as co-author of TRAUMATIC OCCLUSION IN NATURAL AND ARTIFICIAL DENTURES, is actually the originator of "the optical system of denture construction" which was described from other points of view in these pages in August and January, 1938.

ROWE SMITH, D.D.S. (Vanderbilt University, 1923; Northwestern University Dental School, 1928; University of Vienna, 1937) wrote for this magazine on THE SYSTEMIC ASPECT OF PERIODONTAL DISEASE in November of last year.

JEROME M. SCHWEITZER, D.D.S. is a familiar name to our readers. His last publication here was in December: FULL DENTURE REBASING TECHNIQUE.

HARRY L. ARONSON received his D.D.S. at the Chicago College of Dental Surgery in 1926 and attended the University of Indiana and the Dewey School of Orthodontia. Doctor Aronson is a general practitioner.

Factors in Correcting Jaw Position Relative to the Abnormal Temporomandibular Joint

(*Second Installment*)

TRAVIS E. KALLENBACH, D.D.S., St. Louis

MUSCULAR BALANCE—Muscular balance is a primary objective among the principal factors to be considered in correcting abnormal joint conditions and maintaining normal joint action and mandibular movement. Muscular balance is a balanced control of the powerful forces of mastication, which if out of control will cause destruction, because the forces will seek a balance by destroying whatever inhibits them. Each muscle or part of it has a directional force, and each in itself is unbalanced in strength relation to the other. Collectively, these forces counterbalance one another during function, resulting in mean directional forces which converge to a point. This point is located and moves within a hypothetical normal central area of muscular balance. This area is definite although irregular. Assuming it to be like an irregular surface, the focal point of the mean directional forces travels over its surface governed by the mean direction resulting from mandibular movement and the joint's action. This area, in which the focal point of the forces moves, is, for all practical purposes, located between a line drawn perpendicularly from the juncture of the ramus and the corpus of the mandible and one perpendicularly in the region of the molars—near the second molar region.

When the two sets of muscles function to close the mandible, they function with equal force until resistance is offered. If the resistance is a plane common to the two sets of muscles the force remains equalized regardless of the degree of contraction of the muscles; the center of muscular balance is likewise unchanged. If the plane of resistance is irregular and offers less resistance at one point than another, greater effort and force are required at that point; hence, unbalanced forces of occlusion and the

DIGEST

1. Wider knowledge and understanding of the closely associated factors relative to functional disorganization of the mouth and teeth and proper treatment is imperative to early prevention of abnormalities and disturbed function of mandibular articulation. It is tenable that lack of knowledge and faulty restorative technique have actually created or perpetuated many of the worst temporomandibular joint disturbances.

2. Normal function of the temporomandibular joint is often disturbed by abnormal wear and tear of the mouth and teeth, mutilation, accidental injury, trauma (surgical or mechanical), habit, and failure to restore the normal vertical arc dimension and muscular balance in prosthesis.

3. The syndrome recognized by Doctor James B. Costen of St. Louis is classic for diagnosis of lesions and complaints in the structures of and adjacent to the abnormal or afunctional joint.

4. Treatment is largely symptomatic and based on the knowledge and diagnosis of abnormal conditions existent in each individual case.

5. Treatment to correct positional relationship of the mandible prior to reconstruction is frequently necessary.

6. The most important underlying factors for corrective treatment are summarized as follows:

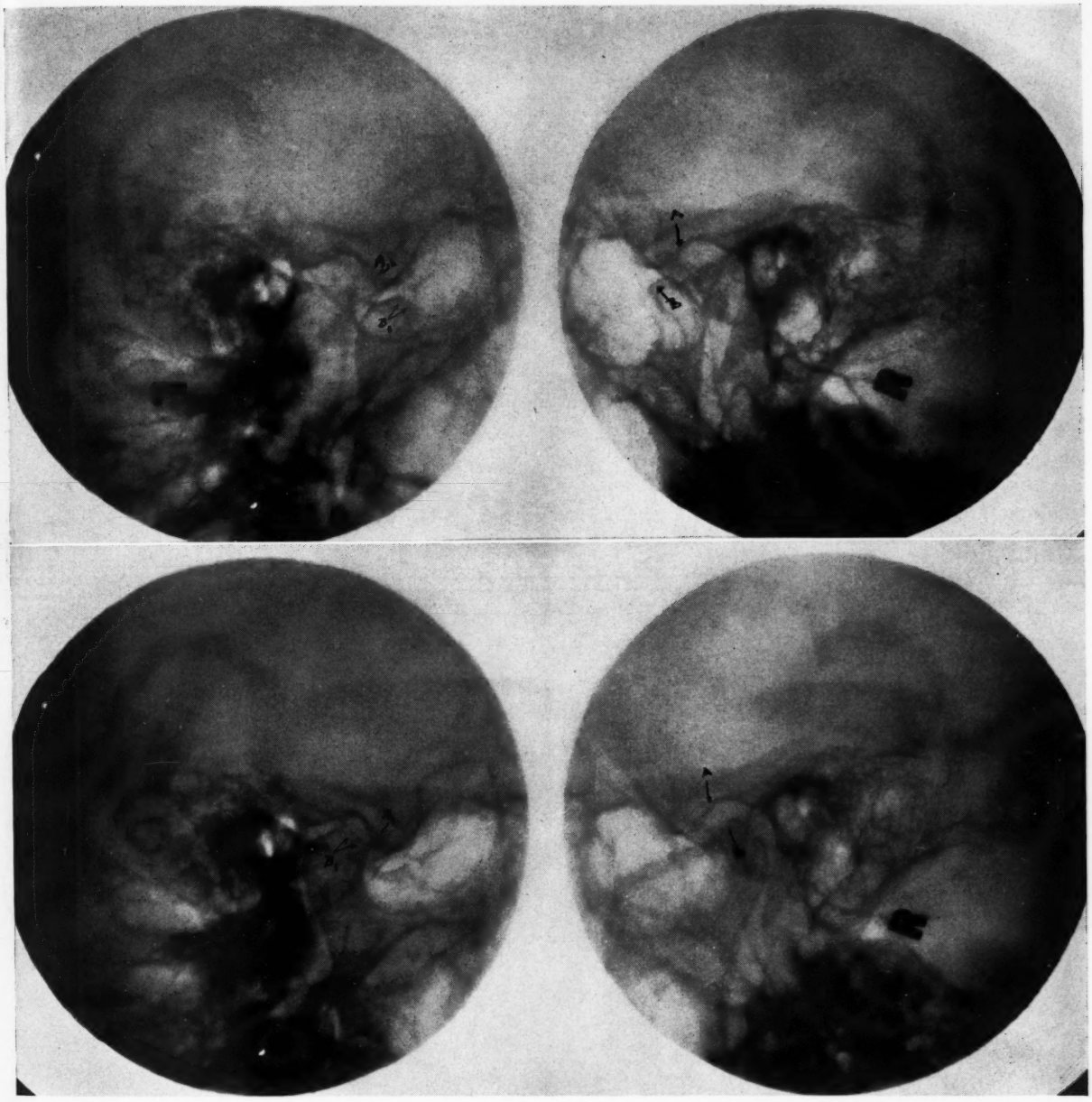
(a) Muscular balance is the chief guiding factor and must be determined by the patient's own registration to prevent error and to locate the proper centric relation of the mandible. It has been a common error to endeavor to establish centric relation in abnormal cases as in the normal by registering it with the condyles in the most retruded position, which is not in this case normal, and as a result, an incorrect center of muscular balance was established, whereby the mandible later moved forward to the position of correct muscular balance and necessitated rebalancing of occlusal form, chiefly by grinding cusps.

(b) The mean resultant or focus of muscular force must be reestablished and allocated within the normal central area of muscular balance, which is described in the text.

(c) The vertical arc must be corrected dimensionally to permit proper muscular tonus and tissue tension and to allow the condyle to be removed from the abnormal retruded position (forward and down).

(d) The functional occlusal plane must be established concentric with the corrected arc of mandibular movement.

[1]Normally, the definition of centric relation is "positional relation of the mandible to the maxilla wherein the condyles are in their most retruded position in the glenoid fossa from which lateral movement starts." Applied to the abnormal temporomandibular joint, this definition is incorrect because of the retruded position of the condyles in the eroded and excavated fossae. Centric relation, therefore, in the abnormal must be determined first by the patient's registration of comfortable muscular balance in conjunction with guides to a normal occlusal plane supplying the greatest contact surface. This must be registered with the guides in place supplying the corrected vertical dimension, or opening, which will carry the condyles forward and downward to a normal position on the articular eminence away from their most retruded position in the fossae (Figs. 18, 19, 20, and 21).

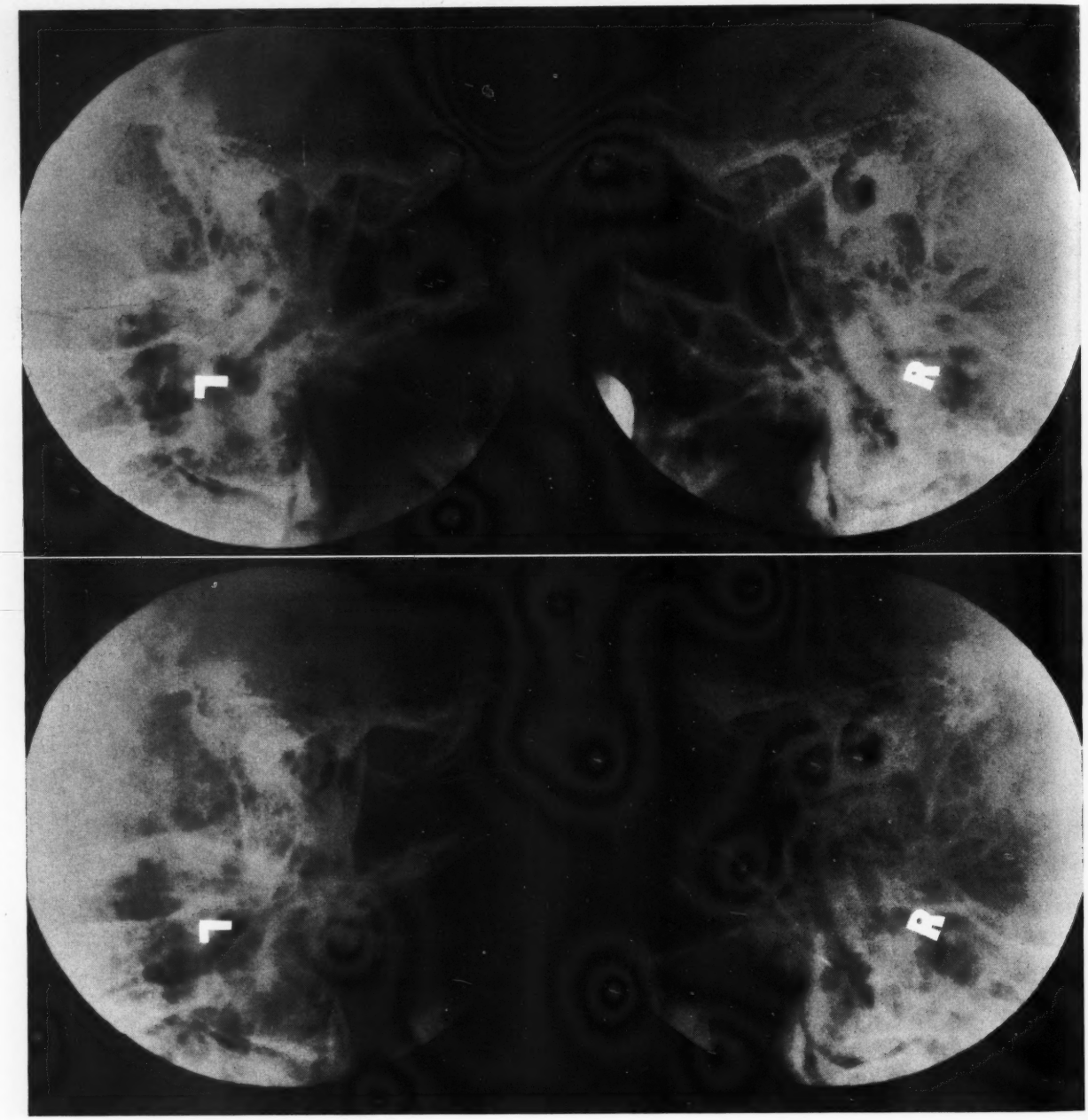


Figs. 1 and 2—The left temporomandibular joint shows evidence of considerable flattening of both the articular eminence and the head of the condyle. The right joint space appears to be normally spaced whereas the left joint space is markedly diminished. A slight thickening of the condyle of the right joint seems evident. The cortical of bone on the articulating surface of the right joint is unbroken at A and B; at A_1, left joint, it is definitely broken and fuzzy; also at the articulating surface of the condyle in the left joint at B_1.

center of muscular balance shift to the side of greatest contraction.

Plane of Occlusion—The plane of occlusion is the second underlying factor equal in importance to "muscular balance." The normal functional occlusal plane conforms relatively with the condyle paths to confine muscular action within its normal central area of balance. It is evident that mutilation or distortion of the normal functional occlusal plane, which is a key factor, interrupts muscular balance by causing a disequilibration of forces to accommodate th distorted plane, thereby changing the central area. The abnormal central area of muscular balance then no longer conforms harmoniously with the temporomandibular joints and reacts to destroy their normal function by altering their structures. Centric relation of the mandible to the maxilla is thereby also destroyed.

Centric Relation[1]—Centric relation is a factor that may cause considerable difficulty for the operator and defeat his end-results if applied to the abnormal in the same way as it would be to the normal. In the restoration of the normal, centric occlusion is frequently a guide in obtaining the correct bite registration; but in the abnormal (with wide lateral mobility as a result of lateral force predominating over the verti-



Figs. 3 and 4—(Another case.) In the closed view (Fig. 3, Top) the right joint is normal in its articulation. The incline plane of the articular eminence and the articulating surface of the condyle are shallower and straighter than in most cases but are probably functionally normal to this patient.

▶Note the continuous dense layer of bone running uninterrupted throughout the superior surface of the fossa down the posterior wall, forming the tympanic plate immediately in front of the exterior auditory canal. Note also the hard dense plate of bone on the superior surface of the condyle. Normal space exists between the condyle and the articular eminence to permit the meniscus, although perhaps reduced in thickness, to function as a pad between these surfaces.

In the open view (Fig. 4, Bottom), it may be seen that the condyle moves forward normally on the anterior two thirds of the eminence. All surfaces of the right joint are intact; they show no etching nor roughening as are seen in the abnormal left joint of the same patient.

The left temporomandibular joint shows abnormal articulation. Note that the space between the articulating surfaces of the condyle (forward inclined plane) and the anterior-superior surface of the articular eminence, which is normally occupied by the meniscus, is apparently destroyed. The double joint attachments are thereby partly destroyed and loosened, and the over-closure of the joint and the articulating bone surfaces are permitted to rub on each other. This is indicated by the fact that the hard dense layers of bone on the crest of the articular eminence and on the gliding surface of the condyle show reciprocal wear and thinning out, a fuzziness and indistinct line of demarcation. This grinding of the bone surfaces on each other is frequently the cause of crepitation in an abnormal joint. The loss of bone on these two surfaces in addition to the thickness of the meniscus is probably an eighth of an inch—at least sufficient to cause a looseness of the capsular ligaments and attachments and a consequent looseness of the joint in all directions of its articulation. This condition presumably alters muscular forces applied to the left side. To substantiate this, note the increased range of articulation posteriorly into the posterior wall of the glenoid fossa (the tympanic plate) which is not an articulating surface and against which the condyle should not rest. Note also the deep erosion and excavation of the tympanic plate in contrast to that of the right side. In the open view (Fig. 4) the excavation seems to extend nearly through the posterior wall of the fossa into the exterior auditory canal. It will be noted in the right (open view) that this wall has not been encroached upon and is intact.[1]

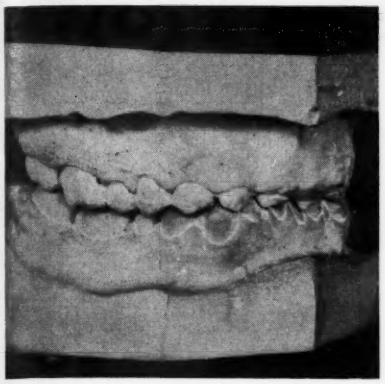
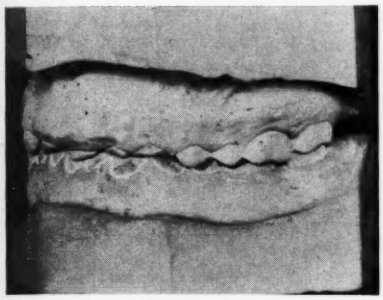


Fig. 5



Figs. 5 and 6—Right and left views of models of another case showing disorganization of function of teeth and destruction of temporomandibular joints by muscular unbalance as a result of injury. (Unilateral type.)

cal, unilateral distortion of the occlusal plane, and distorted central area of muscular balance when the teeth are in contact), centric occlusion would be a false guide. Force on the chin or undue resistance at any point to muscular force will falsely register muscular balance and the occlusal plane.

One more caution in this respect is that the Gothic arch tracing registers the abnormal conditions as well as the normal and does not seem to serve as a reliable guide to centric relation in reestablishment of abnormal cases.

The center or normal area of muscular balance in abnormal cases must be determined and registered by the patient's feeling of comfort and equalized force. The guide planes of occlusion must be approximated at first, faced with a soft wax or plaster which will offer the least resistance to coordinated muscular force, placed in position, and the patient instructed to mill them with a gentle steady force. (It is almost unbelievable how some patients can show a definite mandibular position of relief and comfort without solicitation on the operator's part.) It is well to note here that in some cases of expert reconstruction, the purpose was not accomplished upon completion, because of lack of normal muscular balance. The central area was in such cases allocated too far removed from normal, although the occlusal plane was constructed by use of the balanced occlusal guide. Here the fault lies in unequal tension of the forces during the registration of the centric relation. To this error alone some attribute the failure of correcting vertical dimension and occlusal and joint deformities.

The degree of opening or increasing the vertical dimension should be gauged largely by considering the relation of anterior teeth; their size; extent of wear on lingual of upper and labial of lowers; degree of displacement labially of uppers as a result of trauma against their lingual surfaces; and most important, the degree or extent of underbite which reveals to what appreciable degree the mandible is retruded. These duly considered, a protrusive edge-to-edge relationship is observed. Inasmuch as this edge-to-edge relationship depends on the degree of wear on the incisal edges, this point of relationship or a point near the edge-to-edge position will determine the amount of opening in the posterior region. (The purpose of reconstruction when vertical dimension has been lost is not to restore perfect teeth with normal dimensions and deep cusps as in the young person.)

In the unilateral case, aligning the median line of the lower teeth with the upper teeth is sometimes a guide. More important as a landmark is the point of normal contact on the normal side.

Curvature of Occlusal Plane—The curvature of the occlusal plane must be synchronized, concentric, and identical with the arc of mandibular movement before occlusal balance is possible. It must not be presupposed that because this curvature is established and maintained during reconstruction that balanced occlusion is established. Frequently grinding of facets on cusps or milling is necessary to prevent slight interference to balanced occlusion, but this is figured in thousandths of an inch rather than in millimeters.

Proper balanced occlusion results by properly establishing the balanced occlusal plane with the center of muscular balance and normal centric relation and frequently, as mentioned, by "milling in." Proper centric occlusion follows as a result of reestabilshing normal centric relation.

It is evident that the abnormal relationship of the two most closely associated and most important factors (occlusal plane and muscular forces) is responsible for abnormal changes of the temporomandibular joint. By the character of the change of the occlusal plane, it may be determined to what degree the abnormality of the joints is unilateral or bilateral.

Classification

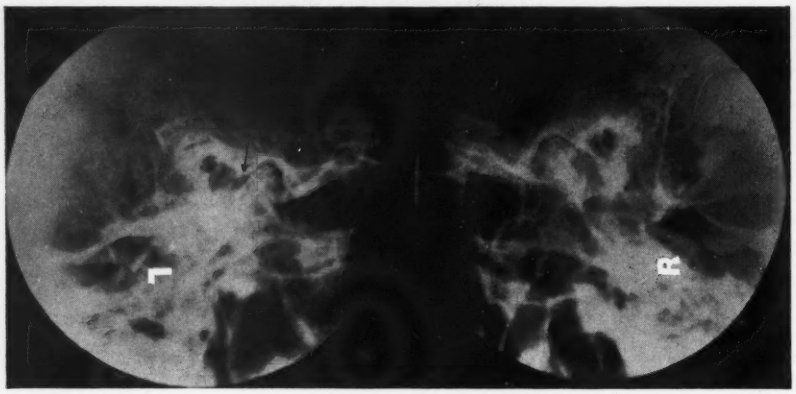
Cases of disharmony of these factors are classified as follows:

(1) bilateral loss of vertical di-

Fig. 7—Patient, aged 42. Treatment of unilateral joint dysfunction by unilateral splint. Complete relief from symptoms in two years. Reconstruction was then made. Note intrusion of second molar resulting in reversed plane of occlusion and separation of lateral and cuspid on shortened side.

Fig. 8

Figs. 8 and 9—Right and left views. Bilateral joint destruction by mutilation and neglect. Painful symptoms accompanied by semi-deafness and tinnitus. Reconstruction completed in February, 1938 with recovery from symptoms.



Figs. 10, 11, 12, and 13—Roentgenograms of case reported in text.
Fig. 10: (October, 1936). Both temporomandibular joints at rest in closed position, showing erosion and slight absorption of the tympanic plate of the left with reduced joint space between posterior surface of the condyle and tympanic joint surface.

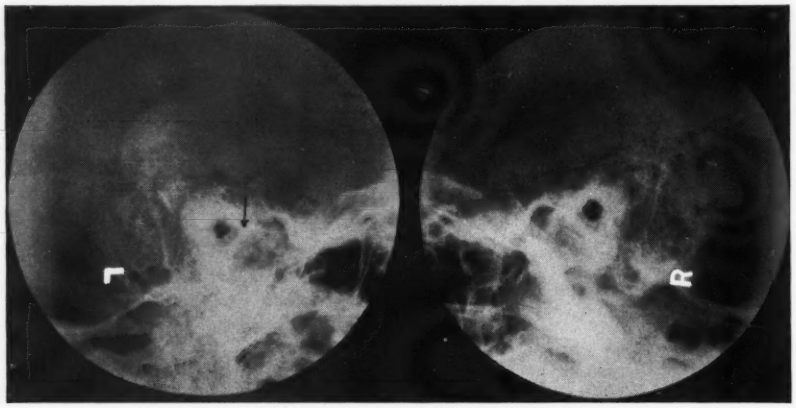


Fig. 11: (October, 1938). Same views as in Fig. 10, after prosthetic corrective treatment over a period of two years. Unmistakable evidence of increased density of the tympanic surface is present. This is indicative of regeneration of bone or cartilage with increased joint space to result in a comparatively normal articulation.

Fig. 12: (October, 1936). Both temporomandibular joints in open position. Left condyle shows fairly normal anterior excursion over the articular eminence whereas the right appears partly ankylosed with the head of the condyle resting against the anterior surface of the glenoid fossa.

mension; (2) unilateral loss of vertical dimension (Figs. 1, 2, 3, and 4); (3) all molars missing in either arch; (4) cases edentulous on one side; (5) cases in which occlusal plane on one side is reversed to that of the other, and (6) cases of exaggerated vertical dimension.

1. Bilateral loss of vertical dimension permits retrusion of the mandible in the glenoid cavity, considerable underbite of the anterior teeth, bilateral change in form of the mandible by the tendency of the forces to straighten it from the point of its articulation to the foremost tip of the corpus, and atrophic changes in the joint.

2. Unilateral loss of vertical dimension creates asymmetrical atrophic changes in the joint and in the form of the mandible (Figs. 5 and 6). Muscular force in this instance (Fig. 7) is balanced to the point of first resistance when additional force is required on the shortened side to occlude the teeth (Figs. 1, 2, 3, 4).

3. In cases in which all molars are missing in either the upper or lower arch, resistance to muscular force at the most important area of the mandible is removed, thereby transmitting its force to the glenoid cavity where it will meet with resistance (which it is not intended to do). This type and types 4 and 5 evidence the worse joint disturbances.

4. Cases, edentulous on one side, either upper or lower, usually display unilateral joint disturbances. The forces of occlusion meet resistance by the teeth on one side and none on the other. This means that force is applied to the corpus on the one side and to the ramus, condyle, and glenoid cavity on the edentulous side. Torsion takes place.

5. When the occlusal plane on one side is a reversed arc to that of the other, both joints suffer because of torsional wear and unlimited lateral movement.

6. Fulcrum action of molars permits severe erosion of articular eminence and abrasion of the condyle, which is often painful (Figs. 8 and 9). Limited lateral excursion is evident.

Gothic Arch

I have said that the Gothic arch registers the abnormal as well as the normal. For this reason it is not adaptable to use in the abnormal case and frequently not to the normal. Let us see what happens to it under different or varying circumstances:

First, the Gothic arch is registered with condyles in their most retruded positions in the glenoid fossae. In badly excavated fossae, with articulating surfaces of the condyles eroded and flattened, the perforated

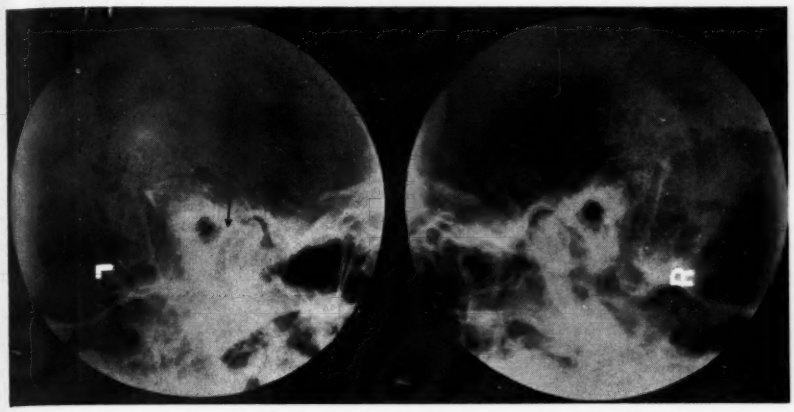


Fig. 13: (October, 1938). Same views as in Fig. 12 after two years of corrective treatment. The tympanic plate on the left shows good regeneration of tissue. The excursion of the right condyle over the articular eminence is now virtually normal.

Fig. 14: (1936) Note degree of vertical opening in posterior region of left side determined to facilitate treatment with splint. Teeth on right side remained in light contact.

Figs. 14, 15, 16, and 17—Models of same case shown in Figs. 10, 11, 12, and 13 and described in the text.

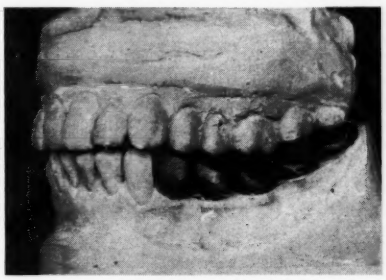


Fig. 15: (1936-1938). Splint constructed and placed to maintain vertical opening on left side. Gradual relief followed and was complete in two years.

Fig. 16: (1936). Relation of teeth prior to treatment. Trismus on this side, left; semi-ankylosis on right. Other symptoms given in report of case in text.

Fig. 17: (1938). Splint removed and reconstruction completed. Patient entirely recovered from symptoms.

or nearly perforated menisci and loosened capsular ligaments and joint attachments present the poorest place to attempt to begin a registration of lateral movement and call it "normal" (Figs. 1 and 2).

It should be borne in mind that the Bennett movement of the worn condyle on the eroded irregular or flattened surface of the articular eminence is altered in the loose or semi-ankylosed joint; and that its distorted path in the lateral and bilateral types and lack of movement in the semi-ankylosed types of abnormal joints will definitely register the Gothic arch tracing falsely and make it valueless as a guide for positional relationship.

If the abnormal case were reconstructed in accordance with the position dictated by the Gothic arch tracing, it would be an attempt at perpetuating the abnormal condition.

The importance of considering regaining normal muscular balance as a primary factor in correcting cases of joint abnormality and the fallacy of attempting the use of the Gothic arch tracing as a guide to correction may be demonstrated in the accompanying case history of trismus and ankylosis (Figs. 10 and 12). Treatment and correction was started in this case in October, 1936. The gradual relief of painful symptoms was complete by the spring of 1938; however, treatment was continued for another six months to allow sufficient healing of joint structures (Figs. 11 and 13) and assurance that there would be no return of symptoms before permanent reconstruction was started. In September, 1938 the permanent reconstruction was made.

Report of Case of Trismus and Semi-Ankylosis of Mandibular Joint

History—A woman, aged 34, presented with severe pain about the ears and temporomandibular joints, in October, 1936.

The history revealed that there was an attempt at forcible reduction of the mandible at an early age. Beginning about 1930, a marked discomfort around the joints and ears, inability to complete a yawn, and crepitation in the joints were noticed by the patient. Later, facial neuralgia, fatigue and soreness of the muscles about the left joint, temporal and occipital pain on the left side, and pain in the right joint developed.

Otologist's Examination — Doctor James B. Costen of St. Louis made the otologic examination and reported that the sinuses were clear, the throat and ears normal. The mouth opened with a crunching noise within the mandibular joints, and it was limited to about three fourths of an inch opening between the incisors. Other openings were only half this extent.

Clinical Examination—Clinical examination revealed extreme pain on pressure over joint areas which was worse on the right side; there was limited movement of the right condyle head during mandibular movement and trismus of the muscles was present on the left side (Figs. 14 and 16). The patient was unable to open her mouth wider than the width of the index finger placed between the anterior teeth. On opening this far, the mandible shifted to the right, showing the right condyle pivoted. The patient was unable, even by extreme effort, to move the mandible to the left side while the mouth was either open or closed.

Roentgenographic Examination—A roentgenogram taken October 6,

Fig. 18

Figs. 18 and 19—Front and profile views in another case of temporomandibular joint disturbance prior to treatment.

1936, showed the tympanic plate (Figs. 10 and 12) and the articular eminence eroded and notched and the articular surface of the eminence steepened on the posterior aspect, with flattening of the superior surface, posteriorly, of the left condyle (Figs. 10, 11, 12, and 13). The right joint structures appeared normal. Open position showed only slight movement of the right condyle, a pivoted position, whereas the left condyle moved to the crest of the articular eminence.

Treatment—Treatment was symptomatic and instituted by a splint on the lower left side to prevent impaction of the tympanic plate by the condyle and to gain joint space to permit healing and regeneration of the joint structures (Fig. 15). As this was accomplished, the symptoms were simultaneously relieved.

Two years later, September, 1938, examination was again made. The patient showed no evidence of trismus or ankylosis and had no pain. She was able to open her mouth normally and shifted the mandible laterally to the right or left with ease. All mandibular movement was found to be normal. Roentgenographic observations at this time showed regeneration of structures of the left joint (Figs. 11 and 13) and the increased movement forward and downward of both condyles.

Permanent reconstruction was then made with no return of painful symptoms and the completed case (Fig. 17) was shown at the clinic of the American Dental Association during its annual meeting in St. Louis last October.

Comment

Sufficient time must be allowed to elapse, in trismus and ankylosis cases, between stages of treatment and the final reconstruction to permit the directional change of mandibular movement to be reestablished to normal as in the case history cited.

Recovery from symptoms of temporomandibular disorders invariably brings about recovery from unpleasant and undesirable personality changes suffered by the patient during the long period of pain and discomfort.

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[1]The posterior surface of the fossa (the tympanic plate) is not an articulating surface and normally should not be encroached upon by the condyle. Abnormally, this is the result of the joint accompanied by a change in direction of muscle forces which permit the condyle to jump across the fossa backward from the articular eminence to the posterior wall. (Figs. 3 and 4).

It is only reasonable to assume by this evidence of looseness and destruction of joint surfaces that the mesial border of the glenoid fossa, wherein lies the petrotympanic fissure and the auriculotemporal nerve has been similarly encroached upon and altered by lateral excursion of the jaw. It is presumed that it is for this reason that a patient will open the jaw to a preferred side or develop an abnormal rest position to one side as a means of subconsciously relieving uncomfortable, even painful symptoms caused by this encroachment on the mesial border. When this clinical symptom is evident, the patient can open to the opposite side only with conscious effort and anatomic difficulty.

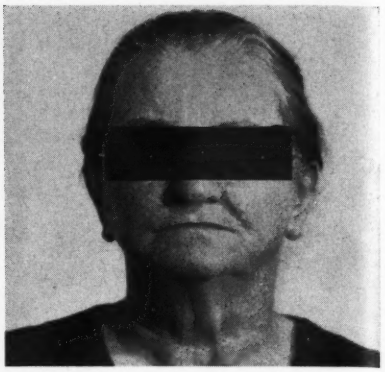


Fig. 20

Figs. 20 and 21—Same case shown in Figs. 18 and 19 following treatment and repositioning of mandible by dentures.

Announcement of Books Received

FROM PIONEER TO SCIENTIST, By C. E. Black, St. Paul and Minneapolis, Bruce Publishing Company, 1940. Price: Cloth, $3.50; Leather, $5.50.

DENTAL HEALTH EDUCATION AND DENTAL HEALTH SERVICE IN HAWAII: A Survey, By Guy S. Millberry, Sponsored by the Strong Foundation, Honolulu, Assisted by the Department of Public Instruction, Territory of Hawaii, 1940.

THE MERCK MANUAL, Seventh Edition, Rahway, New Jersey, Merck & Co., Inc., 1940.

THE 1940 YEAR BOOK OF DENTISTRY, Edited by Charles G. Darlington, George W. Wilson, Howard C. Miller, Walter H. Wright, George R. Moore, Chicago, The Year Book Publishers, 1940.

TWELVE PERIODONTAL STUDIES, By Harold Keith Box, Toronto, The University of Toronto Press, 1940. Price: $2.50.

Traumatic Occlusion in Natural and Artificial Dentures

I. S. MILLER, D.D.S., New York City and JAMES S. MILLER, D.D.S., Trenton, New Jersey

DIGEST

The authors are of the opinion that "man-made malocclusion" in full upper and lower artificial dentures is preventable.

Four cardinal elements in denture construction are enumerated: (1) registration in three dimensions (height, width and depth) of the movements and positions of the condyles in the glenoid fossae; (2) centric and vertical relation; (3) centric, lateral, and protrusive balance, and (4) a good impression.

Registration in three dimensions enables centric, lateral, and protrusive balance to be secured. An optical system of denture construction is described wherein, by the use of light adapted to an anatomic articulator, the registrations are secured.

THE TERM TRAUMATIC occlusion was first introduced by Stillman in 1914 to designate a disturbance in occlusion observed in most cases of the vertical type of pyorrhea. Since then, through further study and broader application, the concept has evolved into a fundamental principle of dental practice and new names have been coined to describe the entity, such as occlusal disbalance, pathologic occlusion, traumatogenic occlusion, and cusp trauma.

In a consideration of the factors that have contributed most to maintaining the high standard of American dentistry, the concept of balanced occlusion as opposed to traumatic occlusion shares an equal place with that of the theory of focal infection. Balanced occlusion has been the means for raising mechanical perfection to physiologic and biologic harmony.

In the natural dentition traumatic occlusion (malocclusion) will cause many disturbances other than pyorrhea or gingivitis, among them being pulp disturbances, sensitive gingival margins, erosions at the gingiva, certain types of interproximal caries, tooth migrations, obscure pain, certain forms of tic douloureux, absorption of bony portions of the temporomandibular articulation, hypertrophies, and resorption of the interarticular meniscus.

In artificial dentures traumatic or disbalanced occlusion also is one of the principle causes of soreness and tissue atrophy, both in the underlying ridges and in the temporomandibular joints. It causes displacement of dentures during function. In both natural and artificial dentures the presence of traumatic occlusion will interfere with full physiologic function by limiting the proper movement of the mandible and the number of occlusal contacts.

Conscious of the fundamental importance of proper occlusion, dentists welcome the means for increasing their understanding of balanced occlusion and its more precise application. The prosthodontist, periodontist, and orthodontist stand on common ground when matters of occlusal balance are considered.

"Occlusion, in its broader meaning may be termed the closure maintained by the mandibular and maxillary dentures, not only in the static centric relationship, but throughout the full range of the mandibular movements incident to masticatory function," David W. McLean tells us. It is necessary, then, to regard not alone cusp relations, but also temporomandibular relations as components of balanced occlusion.

When the function of mastication with artificial dentures is analyzed, it is found that when the yielding bolus of food is introduced into the mouth, and the masseter, temporal, and internal pterygoid muscles contract to crush it; or when in addition to the elevator muscles there is a united action of the external pterygoid muscles, so that the mandible is in protrusion; or, again, when there is an alternate contraction of the external pterygoid, and the mandible is in lateral—then in such conditions, the crushing force is dependent on the proper stability of the dentures. This stability is in turn dependent on (1) the proper adaptation of the dentures to the underlying tissues and (2) the teeth being set-up over the ridge. These two factors serve until the crushing of the bolus of food is completed, at which time the unyielding porcelain of the upper and lower teeth are in contact when there must be perfect balance in the whole range of mandibular movement in harmony with the temporomandibular articulation. This balance is termed physiologic or balanced occlusion. Anything short of physiologic occlusion is malocclusion or pathologic occlusion.

The causes of malocclusion in natural dentures is beyond control at the present time; however, sober and careful analysis of malocclusion in full upper and lower artificial dentures reveals that this form of malocclusion is man-made and can and should be prevented.

We do not minimize the importance of a good impression and centric relation; but these are by no means adequate for the solution of the problem of occlusion in denture construction. A plane-line articulator is crudely deficient for the construction of prosthodontic restorations. There are four cardinal elements in denture construction: (1) registration in three dimensions (height, width and depth) of the movements and positions of the condyles in the glenoid fossae; (2) centric and vertical relation; (3) centric, lateral, and protrusive balance, and (4) a good impression. These steps are given in the order of their

importance. Registration in three dimensions enables us to secure centric, lateral, and protrusive balance. A good impression gives stability. It is by the use of light and the new optical system of denture construction, adapted to an anatomic articulator, that we are enabled to secure the registrations mentioned.

Optical System of Denture Construction

The new optical system of denture construction is an effective, practical means for precise production of physiologic (balanced) occlusion in full and partial dentures. This system has been originated and extensively applied by one of us (J. S. M.) in denture construction with gratifying results. Lacking balance, most dentures are so deficient that one must be convinced that the temporomandibular articulation and the condylar movements were completely ignored in their construction. In full denture construction the operator may proceed as follows when employing the optical system:

1. After upper and lower impressions are taken and the distance between the temporomandibular articulation and the junction of the median line and the lip is measured, the impressions are sent to the technician who pours models and mounts the upper model in exactly the same relation to the artificial fossae as the maxilla is to the natural fossae (as outlined in the August, 1938 issue of THE DENTAL DIGEST).

2. The technician then forwards to the dentist an upper occlusal plate mounted on a baseplate and the lower base.

3. The dentist attaches the lower occlusal plate to the lower baseplate.

4. A pencil mark is made on the mentum and at the base of the nose (Fig. 1).

Fig. 1—Pencil mark at mentum and base of nose to establish vertical relation and eliminate bite.

5. The patient is instructed to swallow and when the lips are barely touching, as in the rest position of the mandible, the operator measures the distance between the two marks (Fig. 2).

Fig. 2—Lips barely touching, mandible in rest position, and dividers set on the two marks indicating the vertical relation between the mandible and maxilla.

6. The upper and lower occlusal plates are introduced into the mouth and the central bearing point is manipulated until the distance between the two marks is the same, thus establishing correct vertical relation (Fig. 3).

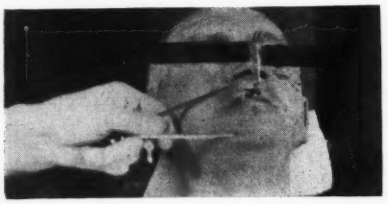


Fig. 3—Upper and lower occlusal plates in the mouth, central bearing point adjusted to distance of dividers, thus establishing correct vertical relation.

7. The light is attached to the lower occlusal plate, the screen to the upper occlusal plate (Fig. 4), and the

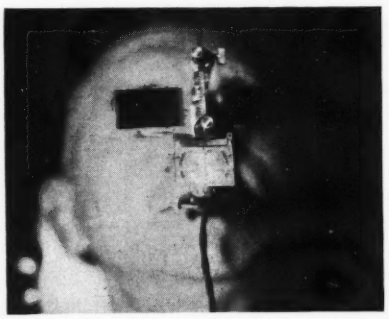


Fig. 4—Light attached to lower occlusal plate, screen to upper, ready for registration in three dimensions (height, width, and depth) of the movements and positions of condyle in glenoid fossa. (For complete description of registration and transfer see THE DENTAL DIGEST, August, 1938).

movements and positions of the condyles in the glenoid fossae are registered in three dimensions (height, width and depth). (For complete description of registration and transfer see August, 1938 issue of THE DENTAL DIGEST).

8. The united upper and lower occlusal plates are removed from the mouth (Fig. 5); the light and screen are likewise removed.

9. The teeth are selected and the united upper and lower occlusal plates and all instructions including the readings on the screen are forwarded to the laboratory.

10. The technician mounts the lower model; separates the two occlusal plates; places the lower occlusal plate in its position; attaches the light to the lower member and the screen to the upper member of the articulator, and by means of dividers, establishes the distance of the central bearing point in relation to the incisive pin (Fig. 6).

He moves the incisive pin so that it is in line vertically with the central bearing point (Fig. 7).

The technician then takes a read-

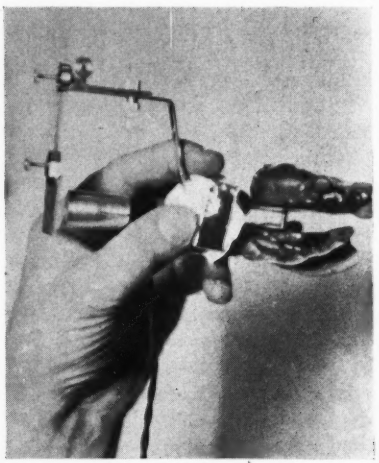


Fig. 5—United upper and lower occlusal plates removed from the mouth and ready to be sent to laboratory, after the screen and light are removed.

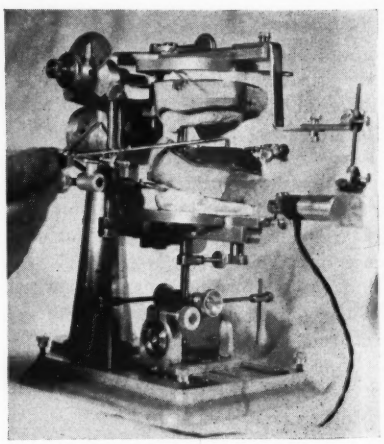


Fig. 6—Establishing distance of central bearing point in relation to incisive pin.

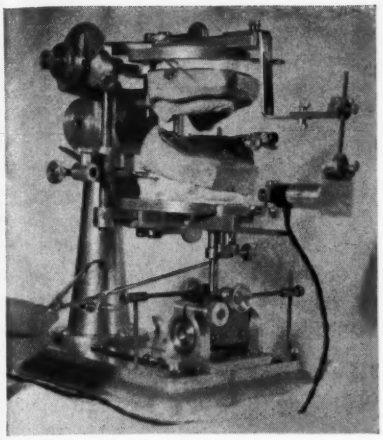


Fig. 7—Incisive pin moved in a vertical line with the central bearing point.

ing on the screen and inclines the artificial condyle until the reading is the same as that obtained by the dentist from the patient, and sets up the teeth (Fig. 8). The case is returned to the dentist for a try-in.

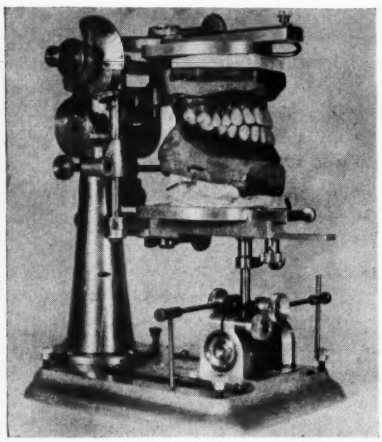


Fig. 8—Artificial condyle inclined to 70° and teeth set up ready for a try-in. (Space between anterior upper and lower teeth is taken care of in grinding to angles obtained from patient. See Fig. 9 for result.)

11. At the try-in, the dentist may make esthetic changes to the anterior teeth, but he must not open or close the vertical relation.

12. When found satisfactory, the dentist sends the dentures back to the laboratory for processing.

13. The processed dentures are placed in the articulator at the laboratory to make sure that the incisive pin is in its proper position and the artificial condyles are set to the degrees obtained from the patient (Fig. 8).

14. The teeth are then ground with pressure brought to bear downward on the lower member of the articulator. The porcelain is cut to harmonize with the inclination obtained from the patient; the incisive guide remains flat.

Incisive Pine in Its Adapted Position to the Screen

Artificial Condyle	Screen Readings
10°	10°
20	20
30	30
40	40
50	50
60	60
70	70

Incisive Pin Moved Forward Half an Inch from Its Adapted Position

Screen Reading	Condyle inclination as recorded on articulator
10°	20°
20	30
30	45
40	55
50	60
60	70
70	80

Incisive Pin Moved Forward 1 Inch

Screen Reading	Condyle inclination as recorded on articulator
10°	25°
20	40
30	55
40	65
50	75
60	85
70	90

Incisive Pin Moved Forward 1½ Inches

Screen Reading	Condyle inclination as recorded on articulator
10°	30°
20	60
30	70
40	80
50	90

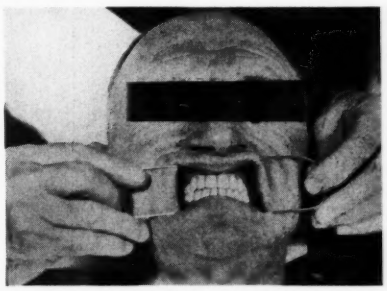


Fig. 9—Finished dentures in mouth.

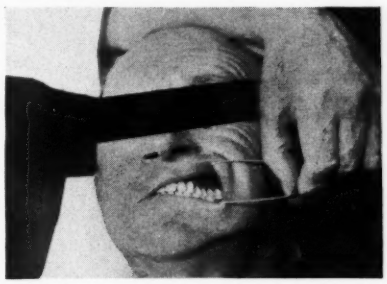


Fig. 10—Occlusion on left side.

15. The light is then attached to the lower member, the screen to the upper member, and if the reading on the screen is the same as that obtained from patient, the grinding has been completed.

16. The dentures are then removed from the models, finished, and forwarded to the dentist where they will be found to have physiologic occlusion (Figs. 9 and 10).

The Central Bearing Point, Incisive Pin, Screen and Light as Agencies for the Establishment of True Condyle Inclination upon the Articulator

The screen and light were adapted to the articulator with the incisive pin at a given position. When the incisive pin is moved forward from that position the height of the cusp is decreased and the reading on the screen is decreased; when the pin is moved back from the same position the height of the cusp is increased as well as the reading on the screen.

During the process of registration a reading is obtained on the screen;

(*Continued on page* 126)

Construction of a Splint in Periodontal Treatment

ROWE SMITH, D.D.S., Texarkana, Arkansas-Texas

DIGEST

When teeth have been loosened by periodontal disease or traumatic injuries, they may be stabilized by splinting or ligating them to firm teeth. How this is done is described in step-by-step procedure. Other indications for the application of the method are also suggested.

WHEN EXTENSIVE BONE resorption has taken place around a tooth or teeth, thus weakening the support, or when the teeth have been loosened from other causes, splinting of these loose teeth to firm teeth will materially help to control movement, which will aid in eliminating periodontal inflammation and in promoting bone regeneration. Nature will thus repair a part of the harm resulting from chronic periodontal disease after all the known etiologic factors have been removed.

The splint may be used on any tooth or any number of teeth. The technique is extremely simple, inexpensive, and the time required for application is short.

Necessary equipment consists of one pair of orthodontic pliers, one pair of crown and bridge scissors or nipper, an amalgam plugger, and stainless steel .012 inch orthodontic wire.

In describing the technique I shall choose the lower incisor teeth from cuspid to cuspid as the teeth to be immobilized.

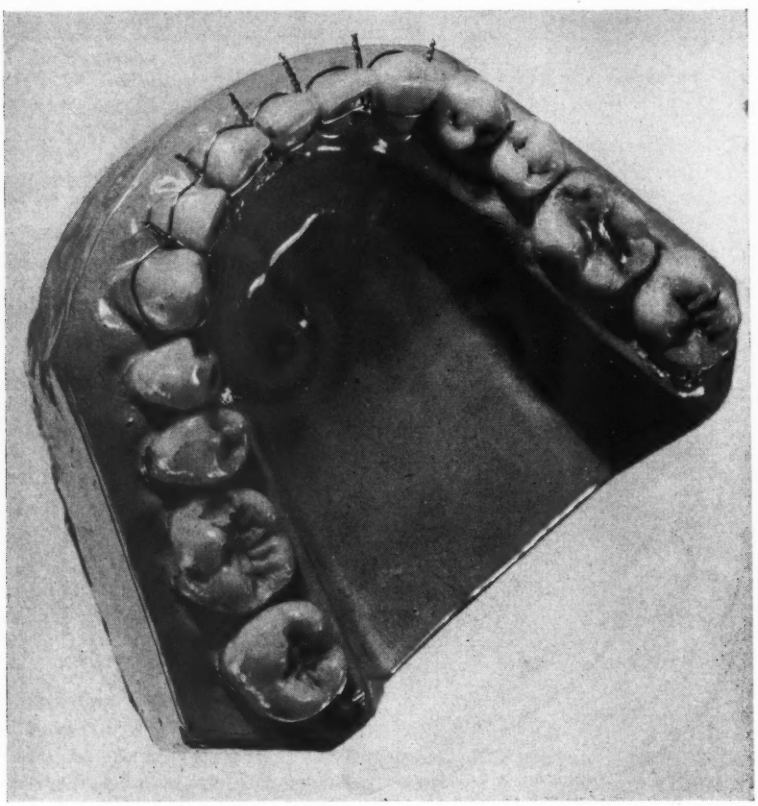


Fig. 1—Continuous loop of orthodontic wire from cuspid to cuspid, with interdental wires in position to ligate and immobilize loose anterior teeth.

Technique

1. A piece of .012 inch stainless steel orthodontic wire, about 5 or 6 inches in length is threaded from labial to lingual below the contact point on the distal of the lower left cuspid.

2. The lingual end of the wire is then grasped in the pliers and brought around to the lingual of the lower right cuspid and threaded from lingual to labial below the contact on the distal of the lower right cuspid.

3. The labial end of the wire is brought to the distal of the lower right cuspid and the two ends are twisted together in a clockwise manner. The wire is always twisted in a clockwise manner to prevent confusion should it be necessary either to tighten or loosen the wire ligature. The reason for threading the wire on the left side first and making the twist on the right is that it is more convenient for the operator who usually works on the right side of the chair. A definite routine increases speed and dexterity.

4. This first piece of wire now forms a continuous circle, and the ends are tightened by twisting with pliers, according to the demands of the case or the contour of the lower arch. In an extremely curved or V-shaped arch the first wire is not tightened so much as in a lesser curved arch.

5. The next step is the placing of the tie wires, or interdental wires. Previously prepared three-inch lengths of the same wire are employed for this purpose. These short lengths of wire are threaded between the teeth, working from left to right; for example, the first interdental wire is passed from labial to lingual between the left cuspid and lateral tooth beneath the previously placed wire circle. The lingual end of the wire is threaded back between the teeth below the contact and above the originally placed wire. The two ends are then twisted together fairly tightly and the excess is cut off, leaving about one-eighth inch of the twisted ends of the wire. This procedure is continued exactly in the same manner until

interdental wires have been placed in the entire area enclosed in the wire circle.

6. After all interdental wires have been inserted and each one has been tightened so that the lingual part of the wire splint will fit tightly against the lingual surfaces of the teeth, the loose teeth are stabilized. This insures a tight splint inasmuch as the circle wire may always be tightened or loosened as required. Care should be taken to bend incisally all free ends of the twisted wire so as to prevent irritation of the lip or tongue.

7. After completion of the splint the loose teeth should be freed from occlusal stress (except for the force that acts mainly against the long axis of the tooth) by careful grinding with thick paper discs and polishing the ground areas with cuttlefish discs. This splint can be left in place from one to six months as indicated.

Indications

This method of splinting or ligating loose teeth to firm teeth in order to stabilize the loose teeth may be employed advantageously for treatment of teeth which have been loosened as a result of traumatic injuries.

The same principle can also be used to advantage to force back into normal position teeth that have been forced into an abnormal position by traumatic occlusion or by granulation or proliferating tissue.

Another instance for its use occurs when an upper anterior tooth has been removed and the space has not been maintained by an immediate restoration. In such cases the other anterior teeth often drift, causing large interdental spaces. If fixed restorations are placed without moving the anterior teeth back into contact, with ligatures, it will necessitate an unnecessary display of gold in order to close the contact.

405 *East Fifth Street.*

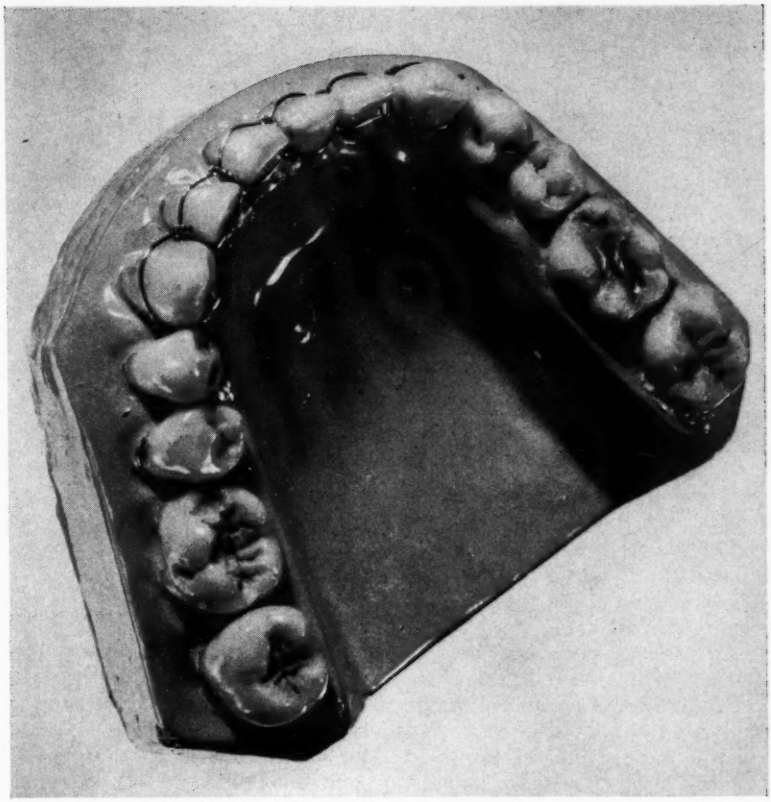


Fig. 2—Free ends of interdental wires bent into interproximal space incisally to prevent trauma of lip.

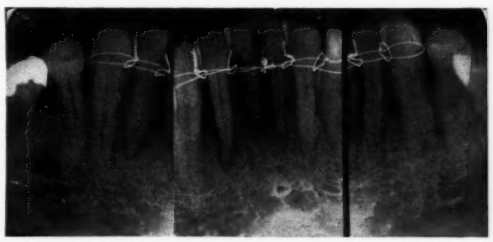


Fig. 3—Roentgenogram showing splint in place. Teeth had been loosened by periodontal disease.

UNSOLICITED MANUSCRIPTS

FROM TIME TO TIME THE DENTAL DIGEST receives inquiries regarding its attitude toward unsolicited manuscripts. These are especially welcome. There are many excellent dentists who have original suggestions, who have improved or modified a technique or have refined an operation; but these men do not contribute to the literature because they are afraid they do not know how to "write." Dentists are not expected to be "writers." If they will tell their story in a straightforward manner, the editors will be happy to cooperate with them in presenting their story. Unsolicited material that is sent to THE DENTAL DIGEST is read with care and open-mindedness and is reported on promptly.

The Deep Bite

JEROME M. SCHWEITZER, D.D.S., New York

DIGEST

The deep bite is discussed in differentiation to the closed bite with a view to clarifying diagnosis, analyzing causative factors, recognizing symptoms early, and determining the proper treatment. First, second, and third degree deep bites and deep bites in closure are discussed and illustrated.

THERE ARE FIVE different types of bites in natural dentitions: (1) the normal overbite in which the anterior teeth do not overlap more than 1.5 mm.; (2) the prognathous bite in which the lower jaw is usually overdeveloped, the lower teeth overlap the upper anterior teeth, and the buccal cusps of the lower posterior teeth are usually outside the buccal cusps of the upper posterior teeth; (3) the tip-to-tip bite in which the upper and lower anterior teeth meet in a tip-to-tip relationship; (4) the open bite in which the anterior teeth have no contact at all; and (5) the deep bite in which the overlapping of the anterior teeth is more than 1.5 mm.

This classification is never absolute in any individual case. Rather, there is usually present a mixture of several types. It is not the purpose of this paper to discuss bites in general as that has been discussed elsewhere.[1] Here an attempt will be made only to analyze deep bites, without reference to treatment.

Definition

A deep bite must not be confused with a closed bite. The deep bite may be due to the tardy eruption of the first molars, permitting the incisors to over-erupt, or it may be due to an abnormal over-eruption of the incisors. The posterior relationship is often normal. A closed bite, on the other hand, is due to an abrasion, either chemical or mechanical, or to a mutilation in some form, of the dental apparatus. This wearing away of the tooth structure, or drifting and tipping of the teeth, causes a change in the otherwise normal vertical tooth dimension and this change produces a closure of the vertical tooth dimension. As a rule, therefore, it can be said that a deep bite is normal to the individual, whereas a closed bite is the result of some disorder. All five types of bites may eventually become closed bites if sufficient mutilation or abrasion occurs.

Illustrative Cases

First Degree Deep Bite—Fig. 1 shows the mouth of a young woman, aged 21, with a normal complement of teeth. The overbite present is greater than 1.5 mm., thus this could not be classified as a normal bite. It is rather a first degree deep bite, one which is really a combination of a deep bite and a normal bite. An overbite greater than 1.5 mm. without a compensating overjet will interfere with the balanced cusp relationship in lateral and protrusive movements of the jaws. What serious effect this interference has eventually is difficult to measure scientifically. In protrusion, the overbite throws the entire stress of the masticating muscular forces upon the incisors without adequate posterior support. There are many cases in which the incisors cannot tolerate this strain, and in middle or old age, will break down; however, there are also those cases in which there is a compensating wearing away of the tooth structures plus a hardening of the anterior alveolar bone which makes it possible for the dental apparatus to continue in good condition for a long period.

Second Degree Deep Bite—Fig. 2 shows the mouth of a woman, aged 29. A full complement of teeth is present and the tissue tone of the entire mouth is excellent. Here the overbite is greater than that in Fig. 1 and thus represents the second degree of deep bites. This case presents greater future hazards in so far as the balance, particularly in protrusion, places more stress on the anterior teeth. The typical inward slope of the upper incisors, however, is not apparent here, although this slope is present in virtually all the third degree cases of deep bites. Fig. 3 shows the same case seen in Fig. 2 in protrusion. Later in life, there may be a compensating

[1]Schweitzer, J. M.: Raising the Bite, D. Outlook, 26:493 (November) 1939.

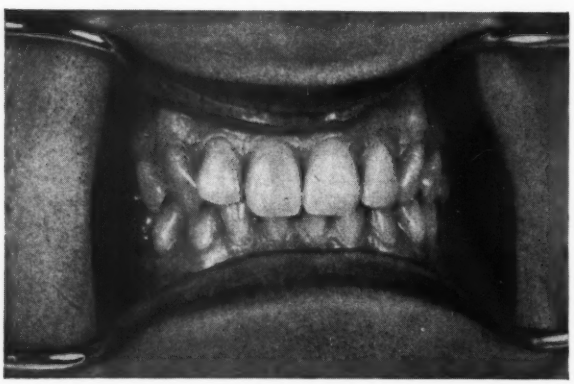


Fig. 1—First degree deep bite in a young woman, aged 21.

Fig. 2—Second degree deep bite in a woman, aged 29.

Fig. 3—Same case as Fig. 2, seen in protrusion.

Fig. 5

wearing down of the incisal enamel and dentine, thereby reducing the vertical distance and permitting better balance. If that does not take place, mutilation begins, and the dental apparatus starts to break down. There may then be a separating of the upper incisors or a fanning out of the upper incisors.

Deep Bite in Closure—Figs. 4 and 5 show cases in which the original deep bites have started to close as the people get older. A deep bite in closure is extremely difficult to correct orthodontically both because the adult patients do not wish to go through the procedure, and because the orthodontists are dealing with adult bone structure which is not so easy to alter as is the bone structure of youth. These cases are not easy to correct mechanically either, as they present many complications.

Figs. 4 (top right) and 5—Setting in of closure of deep bite.

Approaching Third Degree Deep Bite—In Fig. 6, which is that of a woman in her late forties, the third or final stage of deep bites is being approached. Here the typical inward thrust of the upper incisors is apparent. The case in protrusion (Fig. 7) shows a complete lack of posterior balance. The incisal edges are well worn. Undoubtedly, the centrals were considerably longer at an early age.

Fig. 8 shows another near third degree deep bite in the mouth of a man, aged 35. Even at this early age, the dental apparatus is beginning to show the results of occlusal trauma from faulty occlusion. The tone of the gums is not normal, and constant treatment is necessary. Fig. 9 shows the teeth in protrusion.

Third Degree Deep Bite—Fig. 10 shows a true third degree deep bite, in the mouth of a young woman, aged 21. The inverted incisors are clearly visible. The lower teeth are completely hidden. The tips of the incisors

Fig. 6—Approaching third degree deep bite in a woman, nearing 50.

Fig. 7—The same case as Fig. 6, seen in protrusion with complete lack of posterior balance.

Fig. 8—Another near third degree deep bite in a man, aged 35. Occlusal trauma is already evident.

Fig. 9—Same case in protrusion.

Fig. 10—True third degree deep bite in the mouth of a young woman, aged 21. Note inverted incisors with lower teeth hidden.

Fig. 11—Completely disintegrated dental apparatus. The patient, aged 57, is the father of the patient represented in Fig. 9.

strike the lower gingival tissue, producing, at times, a traumatic injury to the gum tissue. The lingual palatal gum immediately behind the upper incisors is often traumatized by the lower incisal edges which strike the gum tissue in this region. This patient is still young, so that a great deal of dental destruction has not yet taken place; however, cases of this sort are poor dental risks, and usually grow progressively worse. Orthodontia at an early age is probably the best procedure, and it is therefore important for the dentist to recognize bites of this type and refer them to the orthodontist for treatment before it is too late.

Heredity: It is difficult to state the influence of heredity in dental conditions, but clinically, evidence points again and again to a direct bearing. Many of the cases of third degree deep bites seem to appear in the same families. Fig. 11 shows the mouth of a man, aged 57, who is the father of the young patient shown in Fig. 10. The entire dental apparatus has completely disintegrated. The teeth have been mutilated, separated, infected. This condition is common in bites of this sort. With a bite of this type it is almost impossible for the patient to go into protrusion. A tip-to-tip relationship is the extreme extent of the protrusive movement, but it is doubtful whether even this movement is ever reached. The biting is done within small confines with an up-and-down movement. Sometimes, a compensating overjet develops later in life as a result of excessive wear and a spreading of the upper arch under the wedge-like pressure of the lower arch. This overjet anteriorly and the slight widening of the upper arch posteriorly permit additional motion in mastication which in some degree relieves the traumatic occlusion.

Fig. 12—Third degree bite in closure.

If the masticatory movements are carried out within the limits described, it follows that in the region of the condyles the glenoid fossa must be deep and the condylar head large and deeply set in the fossa. The articular eminence is always well defined. The condyle rarely, if ever, comes out of the glenoid fossa, but to accommodate this type of bite, the condyle moves up and down in the fossa. Later in life, the articular disc may be considerably thinned. The sagittal registrations, if taken by means of a protrusive bite wax and computed, will be found to be acute —usually between 25° and 50°. Roentgenograms and models verify the accuracy of these observations.

Figs. 13 and 14—Note typical lines around mouth and chin resulting from closure; also shortening of vertical dimension in Fig. 13. Lines softened by raising the bite (Fig. 14).

Fig. 15—Cervical erosion cavities in a man, aged 45. Such cavities are often present in cases of third degree deep bites in closure.

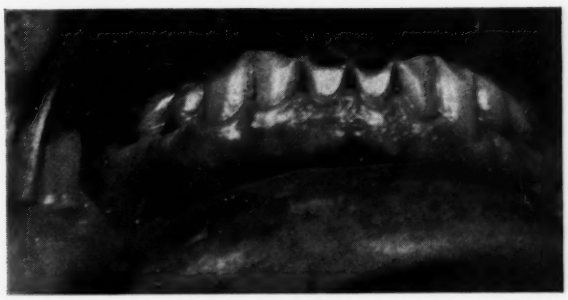


Fig. 16—Same case as Fig. 15. Typical wearing away of labial surfaces of lower incisors through constant grinding of turned in upper incisors.

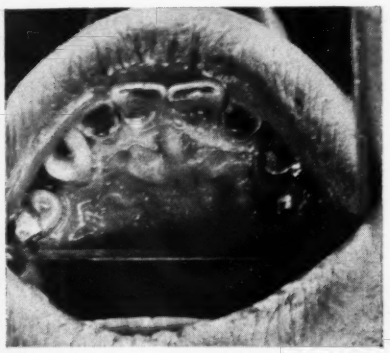


Fig. 17—Same case as Figs. 15 and 16. Typical wearing away of lingual surfaces of upper incisors by constant grinding of lower incisors.

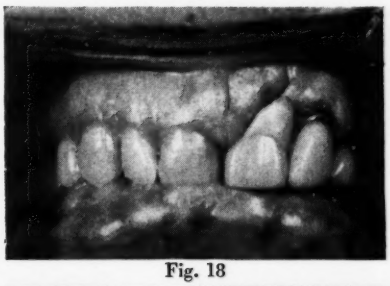
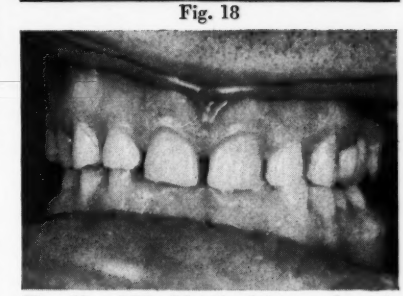


Fig. 18



Figs. 18 and 19—Mouth of sister and cousin respectively of patient shown in Figs. 15, 16, and 17 which suggests the hereditary factor.

Fig. 20

Fig. 21

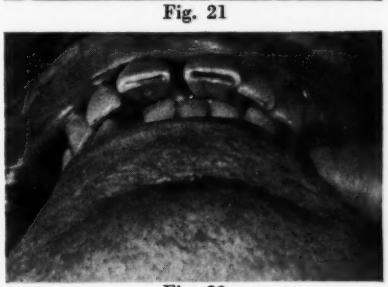


Fig. 22

Lines from Bite Closure: Figs. 12, 13 and 14 show another third degree bite in closure. This closure was due to the failure to replace the missing posterior teeth. The typical facial manifestations of a closed bite are evident in Fig. 13. The lines around the mouth and chin together with the shortening of the distance from the tip of the nose to the bottom of the chin make the diagnosis clear. These lines are not due to the disappearance of the fat pads as a result of old age, but are caused by the closed bite. In a case of this sort the lines can be softened considerably by raising the bite (Fig. 14). To be sure, when these lines are a result of the disappearance of the fat pads, the restoration of the bite cannot help to correct the lines.

Cervical Erosion Cavities: Cervical erosion cavities, such as those shown in Fig. 15 are often present in cases

(*Continued on page* 126)

Fig. 23

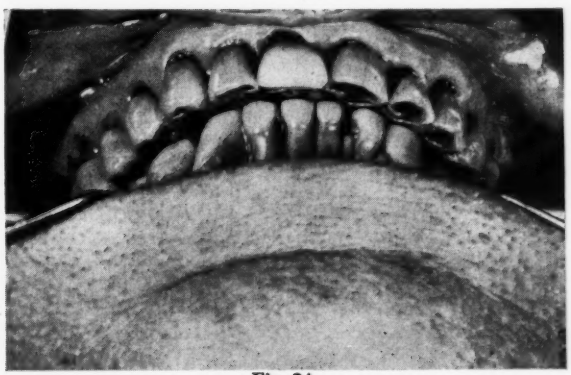


Fig. 24

Figs. 20, 21, 22, 23, and 24—Deep bite resulting from extrusion or continued eruption of lower anterior teeth. Note separation of upper incisors in Figs. 20 and 21 and reduction of crown portion of lower incisors by mechanical abrasion in Fig. 22.

The Editor's Page

DENTISTS ARE CONSTANTLY working around sharp and powerful organs, the teeth, which can cause severe trauma. The bite from human teeth is much more serious than the bite of any animal. The bite of the cat, the camel, and the monkey, according to an eminent surgeon, ranks next to the human bite in seriousness. Morsus humanus is a term for the trauma produced by the human teeth. It is well known that the mouth of man harbors many pathogenic organisms, particularly some of the anaerobic types. It is believed that infections from human bites owe their severity to the symbiotic action of mouth bacteria. Following injury to tissues, particularly tissues of the fingers and hands, there is a contraction of muscles and tendons, so that the infection is drawn deeper into tissues where conditions for anaerobic activity are more favorable and the severity of the infection is thus accelerated.

A study[1] from the department of surgery of Emory University School of Medicine, made among sixty cases of human bites in Negroes, emphasized three factors to account for the seriousness of the infections produced by biting: (1) the virulence of pathogenic organisms; (2) the method whereby infection is conveyed along tendons and tendon sheaths; (3) the complicated arrangement of joint capsules and facial planes which are difficult to free of infectious processes.

Although dentists are constantly exposed to possible injury by the human teeth, it is uncommon in clinical practice for the fingers of a dentist to be severely bitten by a patient. There is, however, always the likelihood of cutting the fingers with instruments and burs and quickly contaminating the wound with the fluids of the mouth which are alive with pathogens. Mason and Koch[2] stress the extreme danger that may come from wounds of the hands when contaminated by oral bacteria. Dentists, therefore, should not treat lightly even the most minor wound suffered while operating on the dental tissues.

Boland[1] says that no standard treatment has been established for the severe wounds resulting from purposeful biting with the human teeth. He recommends, however, that the wound be opened widely for débridement and swabbed with phenol or packed with sulfanilamide crystals. Sulfanilamide is at the same time prescribed by mouth. Boland mentions the application of zinc peroxide used by Melaney, and Melaney in discussing Boland's paper describes his own treatment as follows: "After débridement the wound should be flooded with a creamy suspension of active medicinal zinc peroxide in distilled water, covered with a layer of cotton soaked in the same material, then a layer of cotton wet with water, and then sealed with several layers of petrolatum gauze or sheet rubber to prevent evaporation."

This long editorial comment on a rare type of accident which may befall dental operators is given primarily to warn the profession of the danger inherent in wounds on the fingers and hands when exposed to the oral flora. It is urgently cautioned that any injury to the fingers should not be accepted lightly but should be promptly subjected to vigorous treatment. The encouragement of free and immediate bleeding from puncture wounds of the fingers and the immediate washing with warm water and soap followed by the application of a suitable antiseptic should be the routine procedure even for the pin-point wounds from dental instruments. The dentist largely owes his living to his fingers and hands. He should certainly take no unnecessary chances of infection.

[1] Boland, F. K.: Morsus Humanus, J. A. M. A. **116**:127 (January 11) 1941.
[2] Mason, M. L. and Koch, S. L.: Surg. Gynec. & Obst. **51**:591 (November) 1930.

Clasp Retention on Lower Cuspid

HARRY L. ARONSON, D.D.S.,
Chicago

DIGEST

Although the lower cuspid does not afford horizontal retention owing to its parallel mesial and distal sides, because it has the longest and strongest root, it does offer an advantageous area for clasp retention at the depression or rounded surface at the mesio-labial and disto-labial angle. A technique for the utilization of the lower cuspid for retentive purposes is therefore described.

THE LOWER CUSPID has never been considered an ideal tooth to clasp because there is no horizontal retention owing to the parallel mesial and distal sides of the tooth. The lower cuspid, however, has the longest and strongest root; therefore, it is the logical tooth to be utilized.

The lower cuspid, as has been said, usually has parallel mesial-distal sides; however, in some cases, the mesial and distal sides may converge toward each other from the contact points, gingivally. In either case, there is usually a slight depression or a rounded surface at the mesio-labial and distal-labial angle. It is in this area that advantageous retention may be had.

Technique

1. On the waxing model of the mesial-labial depression a bar is made incisally-gingivally and inclining toward the center of the axis of the tooth. The gingival end of the bar is closest to this long axis.
2. The second bar is made in the distal-labial depression.
3. These bars are connected to the

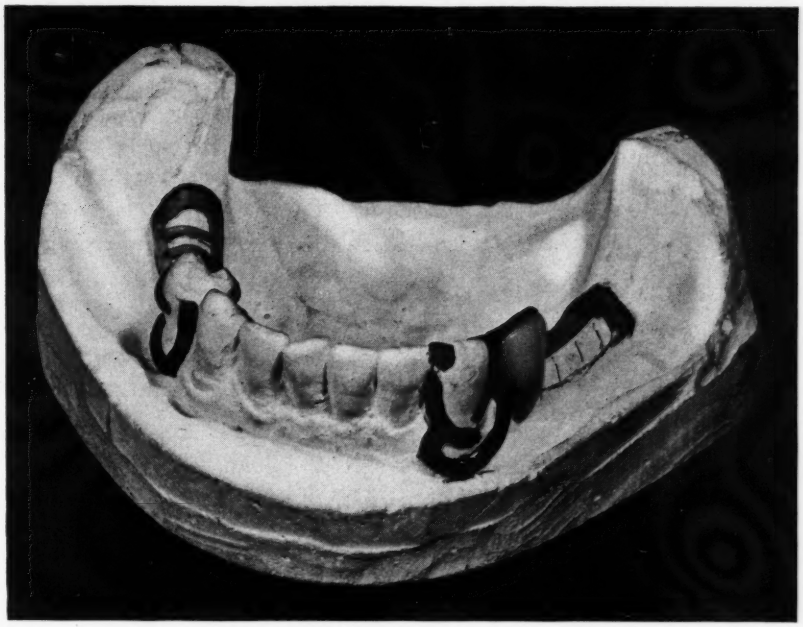


Fig. 1—Labial view of case waxed on model.

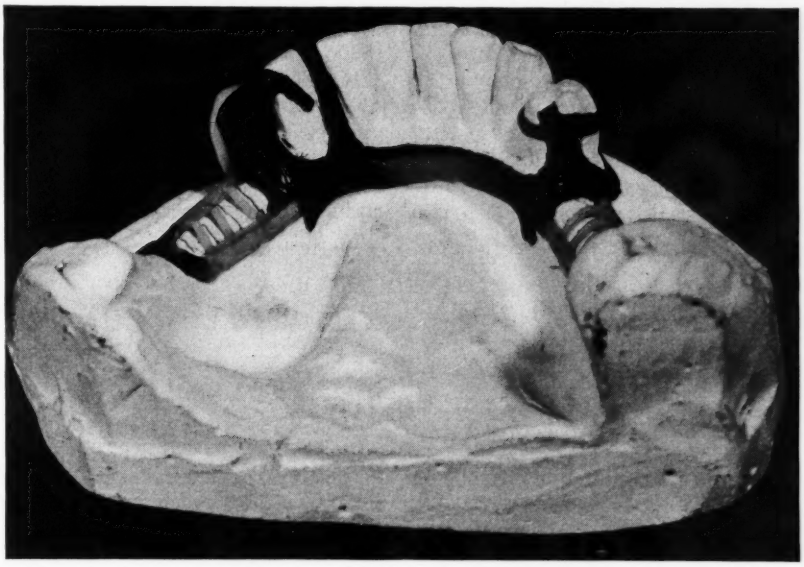


Fig. 2—Lingual view of case waxed on model.

Fig. 3—Case shown in position in mouth.

connecting bars which are joined to the saddle of the case. The bars exert a force toward each other and thus prevent a mesial or distal rotation. A horizontal movement is overcome, because the bars are lodged in the mesial-labial depressions.

4. On the lingual surface of the waxing model of the tooth to be clasped, an upright is extended from the lingual bar of the case upward and over the lingual mesial of the tooth, terminating in a prepared notch, on the labial incisal surface, in the mesio-incisal angle. This prevents the case from tipping labially. At the same time, it prevents the case from settling into the tissue and acts as a rest.

5. Another bar extends from the mesial, incisally, gingivally, and mesially; hence, stabilization is secured from the lingual, incisal, mesial, distal, and labial surfaces.

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The Deep Bite

(*Continued from page* 123)

of third degree deep bites in closure. Fig. 16 depicts the typical wearing away of the labial surfaces of the lower incisors caused by the constant grinding of the turned in upper incisors. In Fig. 17, the typical wearing away of the lingual surfaces of the upper incisors by the action of the constant grinding of the lower incisors may be clearly seen. The patient whose mouth is shown in Figs. 15, 16 and 17 is a man, aged 45. It is interesting to observe Fig. 18, which shows the mouth of the patient's sister, and Fig. 19 which shows the mouth of the patient's first cousin. The effect of heredity on deep bites is obvious in this particular family.

Extrusion Type of Deep Bite—There is another type of deep bite which belongs to a separate class, but must be recognized for what it is. This type is probably due to an extrusion or continued eruption of the lower anterior teeth. Figs. 20, 21, 22, 23 and 24 clearly demonstrate this type of bite. In each case, the lower incisors have continued to erupt beyond the normal occlusal plane. This continued eruption either causes a separation of the upper incisor teeth, as it did in Figs. 20 and 23, or if it does not do that, then the crown portion of the lower incisors is considerably reduced by mechanical abrasion, as shown in Fig. 24. The anterior alveolar bone is usually found to be extremely strong in these cases. The continued eruption of the lower incisors is manifest by the exposed root portions in all these cases. These last three cases are all of men, about 40 years of age. It is difficult to account for the force that causes this over-eruption to take place, but that it does take place is evident.

Comment

It is hoped that this discussion will serve to stimulate interest in the diagnosis of deep bites and of deep bites in closure, so that the treatment of these cases will be undertaken with a clearer conception of the causative factors, and so that the symptoms will be looked for and treatment instituted as soon as possible.

730 *Fifth Avenue.*

Traumatic Occlusion in Natural and Artificial Dentures

(*Continued from page* 117)

the degree of the reading depends on the condyle inclination and the distance between the central bearing point and the temporomandibular articulation. If after the lower model is mounted the central bearing point and incisive pin are in line vertically, then the reading obtained from the patient is the true condyle inclination as recorded on the articulator; but if the central bearing point is anterior to the incisive pin, then the incisive pin is moved to a vertical line with the central bearing point and the artificial condyle is inclined until the reading on the screen is the same as that obtained from the patient.

Example

The reading on the screen obtained from patient on the right side is 30°; in placing the lower occlusal plate with the central bearing point on the lower model, it is necessary to move the incisive pin (Fig. 6) forward 1½ inches to a vertical line with the central bearing point (Figs. 6 and 7). Then, in order to obtain a 30° reading on the screen, it is necessary to incline the artificial condyle on the right side of the articulator to 70° which is the true condyle inclination as recorded on the articulator on the right side.

In my own practice (J. S. M.) and in the practice of those men who have adopted the optical system of denture construction, it is found that an 80° and 85° inclination of a condyle is common. Bearing in mind that 90° is a vertical line, one can appreciate the abruptness of the drop of the condyle in the glenoid fossae at an 85° angle.

It is readily seen by the accompanying table that intra-oral registrations are not and never were true registrations and that extra-oral registrations are not true registrations unless light is employed to register mandibular movements and the incisive pin is moved on a line with the central bearing point and the artificial condyle is inclined so that the reading on the screen is the same as that obtained from the patient. It is safe to state that no mathematical formula can compensate for such errors.

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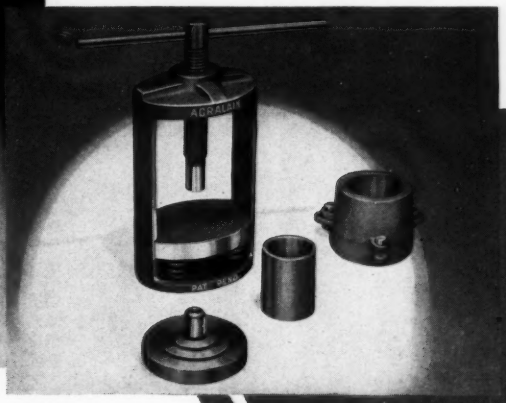

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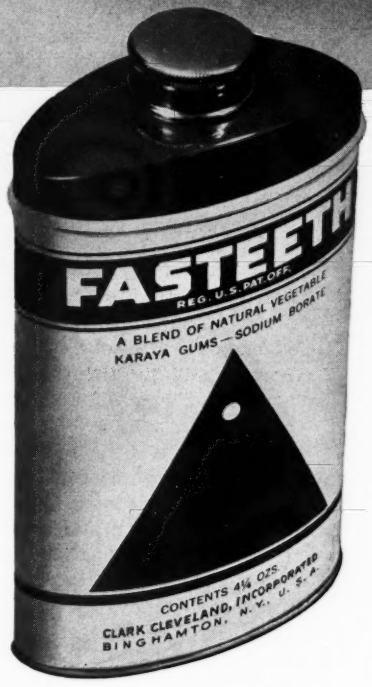

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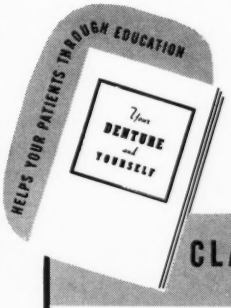

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NOTES ON THE *Cuff*

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Call it dental economics, practice management, patient relations, or any other name, and it adds up the same. There is too much vapid talk on the subject and too many tricksters in the field. I plead guilty to being one who has added his share of banalities and confusion, but by speaking as one who confesses his guilt, I may perhaps be excused from the sharp criticisms about to be directed against other utterers in this field. Dental economics, or whatever euphemistic title is preferred, is not an end in itself. Dentists should have suggestions given them as to how to make a living out of their profession. If they are well fed and well clothed and happy people, they can do a better job of practicing dentistry. Teaching sly tricks of dispensing inferior services is charlatanry, and unfortunately, some of the preachers in this field have engaged in these devious devices. Some of the teachers have been dentists remote and isolated from practice; others, have been dentists whose hands have been bathed in saliva and are not too far removed from the field of instruments-in-the-hand. Some of the commercial interests in dentistry have likewise taken it upon themselves to tell dentists how to run their affairs. A few of these people have not been conspicuously successful in managing their own businesses. Then, a long line of piano movers, ex-insurance men, and broken down banjo players have seen a ripe field in How-to-Be-a-Success-Overnight courses for dentists. A few practicing psychologists have also been attracted to the field and have tossed in a little jargon of their craft to sound important.

Many of the self-help dispensers on the subject of practice management have insisted on the fawning, smirking, head-nodding approach. These are the boys who talk so much about "contacts." Contact the patient; make new contacts; keep up your contacts—until you feel touched on all

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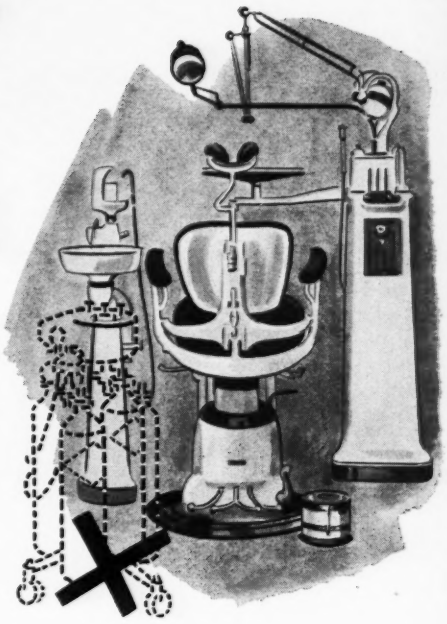

IN DISCUSSING the investment habits of dentists, a recent issue of a national dental magazine* commented, "We can better our economic life . . . . by investing in our own business over which we have control. It is difficult to understand why a dentist will buy stock in a corporation over which he has no control or influence. The same amount of money ploughed back into his own business in the way of new equipment would increase his productiveness and therefore his income."

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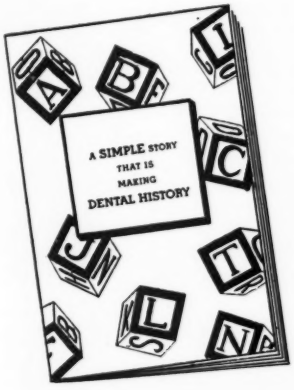
*Oral Hygiene, August, 1940.



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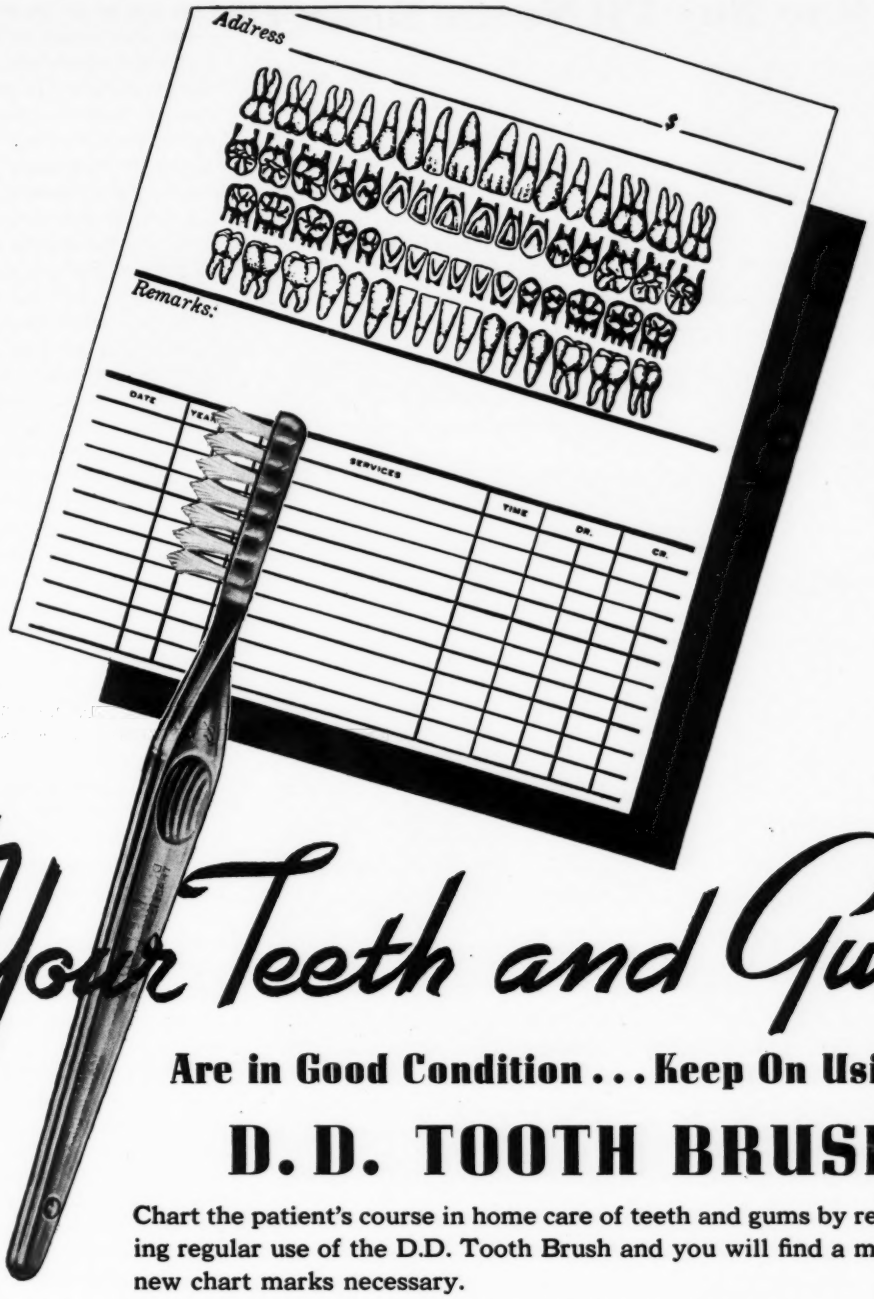
sides. And then after you are jostled and smothered with all the contacts, you are supposed to cultivate these contacts and not only that, but you are urged to cultivate the contacts' hobbies as well. A recent publication, for example, suggests that dentists should cultivate social hobbies that will bring them in contact with more people; moreover, the admonishment is to cultivate fewer dentists and more laymen.

Now, a hobby, it seems to me should be encouraged for pleasure and not with the eye on the box office. If you collect butterflies, you do it because you like to run around with a piece of cheesecloth at the end of a stick and you like to mount the pretty insects on a card to enliven some room. You don't do it because you expect to bump into other butterfly catchers and thus pick them up as dental patients in the procedure. If you do happen to meet another butterfly catcher enthusiast, the circumstances may be fortuitous and pleasant; on the other hand, you may get your nets tangled. When you set out deliberately and say to yourself, "I am going to get a hobby for myself but it must be one that gets me patients," you are not only confusing pleasure with business but you are likely to acquire neither pleasure nor business. Hobbies don't develop by deliberate intention and patients can't be made to stick on any fly paper.

The suggestion to dentists that they should snub their fellow dentists and do their handshaking with laymen is a short-cut to how to kill a dental practice, not a short-cut to practice stimulation. The dentist who cannot have the respect and camaraderie of his colleagues is apt to find his profession sour and his practice negligible. Dentists by associating with each other learn many hints to improved dental service and whatever makes it possible to give better dental care is an unmitigated good. This is not to say that our fields of interest and companionship should be inbred and circumscribed, shortened in perspective and narrowed in breadth. Certainly the lives of dentists must reach out into the versatility of the world.

The same publication referred to suggests that patients who have been on the inactive list be "offered a free x-ray examination to complete the dental history." If that isn't pandering, I can't find the name for it. Den-

(*Continued on page* 134)



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tists may be giving dishes away next.

Another choice bit of advice is the suggestion that the dental assistant should be called to the chair and the dentist "should admiringly demonstrate the operation just completed." There are legitimate reasons for calling the assistant to the chair if she is not already hovering about there—to show her the results of an operation in order to add to her understanding of dentistry, but not blatantly to attempt to create an impression. This method will not fool the patient and may be extremely annoying.

There are many sensible and valuable suggestions that can be made to dentists to make them more understanding and complete people. There are many worthwhile procedures in office management that they can be taught which will increase their efficiency, but the text of all the teaching should be the same: The attempt should be made to show the dentist how exactly and completely he can practice dentistry so that most of his energy can be directed to practice rather than to worrying about the rent.

From the other side of the picture, it is far better for a dentist to take the self-help courses, to listen to the inspirational speeches, than not to show an interest at all in matters of self-criticism and attempted improvement. The fellow who is alert enough to try to improve his position, who is constantly searching for the golden kernel, is going to be a lot better off even if he must plow through a lot of drivel in the search than the fellow who sits in his office with his hands over his paunch, lamenting his fate and hollering that dentistry hasn't been good to him. What has he contributed to dentistry and what has he honestly attempted to get from dentistry? He never attends a dental meeting; he never listens to a dental speaker. He prefers to stew in his own juices. He won't even read. Even one single good idea out of a talk, an article, or a book, makes it worth while. Even if you have to toss ninety-nine bromides out of the window before you find one jewel, it is worth it. Let the boys continue to talk and write on the subject of practice management but let those who stop to listen have their grains of salt handy.

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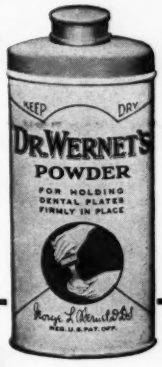

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to whom the eyes of the nation have been directed is the Governor of Minnesota, Harold E. Stassen. It was my pleasure to sit beside him at the dinner of the Minnesota State Dental Association and to see the breadth of his mind and the understanding of the professional point of view which would be a satisfaction to anyone. It was he who said before the dentists of Minnesota and their guests, "You are the custodians of progress in the dental profession throughout the world. War has halted scientific progress everywhere else in this world of ours, and you dentists here in America have the future and the responsibility in your hands." In the days that are ahead, after the bomb craters are filled and the dead will long be in their graves, after the terror of blackouts has passed, there will be the long reconstruction to be done. We dentists in the United States will have a tremendous responsibility in the rebuilding. We will have to help those in other lands who have been dislocated from practice to return to their field of interest. We will have to supply materials and equipment to the dentists of the world. We have now the responsibility of keeping alive while they are engaged in the destructions of war, the spirit of research and of scientific advancement. Governor Stassen who looks so well ahead through the years that lie beyond the war may find it his job to lead us through those testing days.

Quotation of the Month . . .

"The greatest mistake in the treatment of disease is that there exist physicians taking care of the body and physicians taking care of the soul, as these ought not to be separated from each other . . . but just this fact is overlooked by the Greek physicians and therefore many diseases escape them, as they never see the whole."—Plato (429-347 B.C.).

Dental Education . . .

The first meeting of the Council on Dental Education of the American Dental Association was held during the Midwinter Meeting of the Chicago Dental Society under the able direction of Doctor Harlan H. Horner, newly appointed secretary of the Council on Dental Education. The first speaker was Lincolnesque Ray Lyman Wilbur, former Secretary of the Interior. Within the medical arts professions, Doctor Wilbur points out,

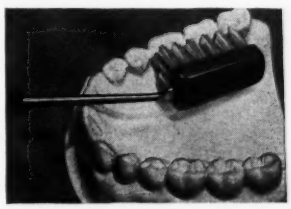
The Unique Design of the SQUIBB *ANGLE* TOOTHBRUSH MAKES IT EFFECTIVE *For All Types of Mouths*

WHETHER the dental arch is wide or narrow; and regardless of what brushing technique you recommend —the Squibb Angle Toothbrush will do an effective cleaning job. This brush was designed with scientific regard for variation in dental arches and each of its several departures from the conventional style of toothbrush meets specific and predetermined requirements.

Notice, for instance, that, instead of the usual bulky handle, the Squibb Angle Toothbrush has a thin, sturdy metal shank and that this shank isn't straight, but is bent at an angle, just like your dental mirror. Thus it is possible to bring the brush head down to the gum line while keeping the handle in a practically horizontal position. It also makes it easier to bring the bristles into contact with the exposed surfaces of *all* teeth and permits gentle, safe massaging of the gums.

Buccal, lingual, labial, occlusal surfaces of teeth—even the back molars —are accessible to the Squibb Angle Toothbrush.

The Squibb Angle Toothbrush has three rows of high quality bristles—six tufts to a row. Two degrees of stiffness — hard and medium. It is a brush you will like to use yourself — one you will be pleased to recommend to your patients.



The thin metal shank permits placing the brush in correct horizontal position so that the bristles may be forced between the teeth permitting more thorough cleansing of interproximal spaces.

The Forgotten Tooth Becomes
The Remembered Tooth With The
SQUIBB *ANGLE* TOOTHBRUSH

faulty training is not so apparent as it is in engineering training, for example. When people die or are maltreated as a result of lack of knowledge or skill on the part of the dentist or physician, it is harder to trace the cause and effect than it is when a bridge collapses as a result of faulty design and execution. Doctor Wilbur believes that the profession should resist federal control in education and licensure and that the profession should develop voluntarily self-protection and self-policing. There are no quick, cheap ways to make competent dentists or physicians nor should there be too much standardization in dental education, for, as Doctor Wilbur said, "Standardization often leads to petrification." Elasticity in the educational method is as important in dentistry as it is in other departments of life.

John T. O'Rourke, Dean of the School of Dentistry of the University of Louisville, was in entire agreement with Doctor Wilbur. He said that "the enduring outcomes of dental education" were the criteria of goodness and that there was always the danger of listening to contemporary, short-lived authority. Principles, fundamental skills and methods are important in the educational method, and in the planning of a curriculum "cook-book, rule-of-thumb" procedures should be avoided.

The new Harvard Plan for dental education came in for considerable discussion. Doctor Sidney Burwell, the Dean of the Harvard Medical School, emphasized that the new Harvard Plan of combining in five years courses for a medical and dental degree represented a *supplementary* not a *supplanting* type of training. John Cooke of Boston, discussing the Harvard Plan from the point of view of the general dental practitioner, indicated that the present clock-hour system in teaching dental subjects should be re-examined in a clear light. Doctor Cooke pointed out that the present course in the Harvard Medical School calls for 4,000 clock-hours of training in four years whereas the course in the dental school required 5,500 hours. It might be found after critical examination of the schedule for clinical subjects that altogether too much time was spent in teaching unimportant, needless things. John Cooke traced some of the transitional, vestigial patterns; for example, that the thirty-two week

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school year was based on a farm economy; that school ended as soon as the planting season began and opened after the harvest.

In my own dental training, I recall the complete waste of time spent in making dental instruments, concocting cements that never set, and the making of fire-clay furnaces in a course in metallurgy. In dental education, some of the needless technical gestures are vestigial remnants of the day when dentists had to make their own instruments, their own cement, and refine their own gold.

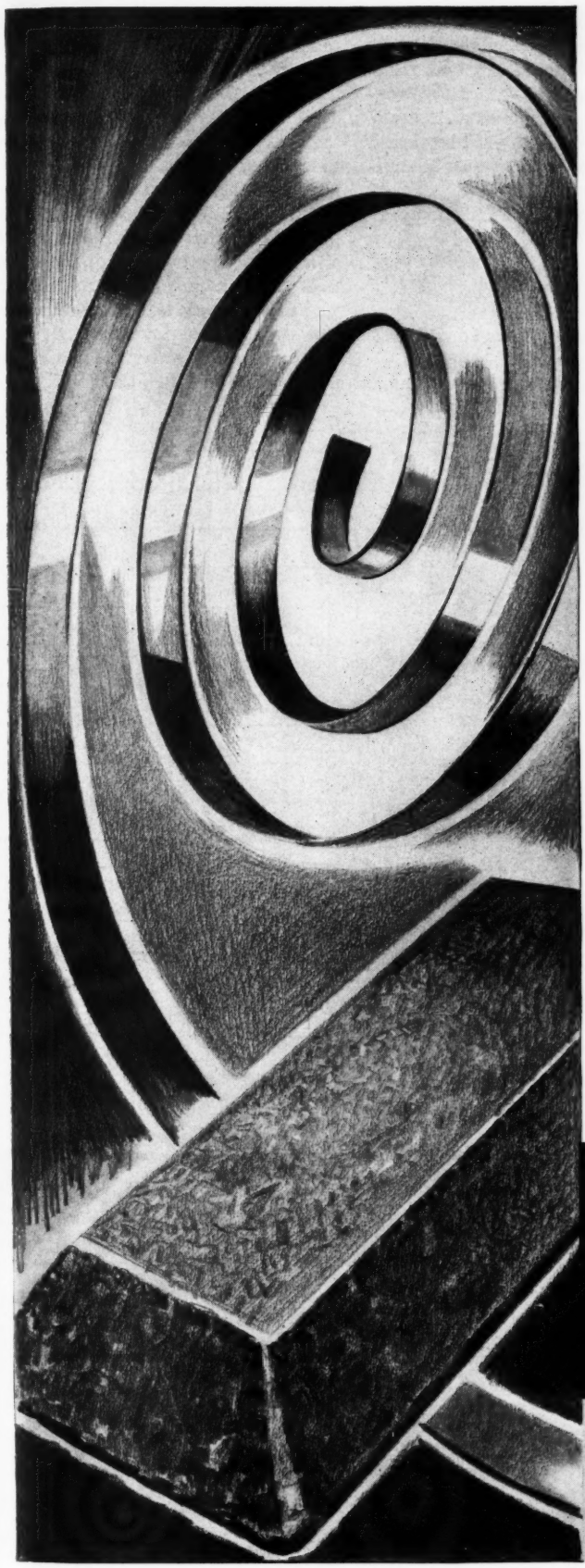
Much of this waste of time and motion in the dental course may also come from interdepartmental jealousy wherein the professor of one department insists that his course be thirty hours because the professor of another course has that number of hours in the catalog. It may take some juggling to expand the material to cover the prescribed hours but the professor somehow makes the adjustments for self-inflation.

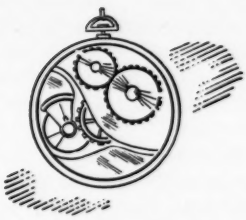
The Harvard Plan, experimental in nature as it is, should be welcomed wholeheartedly if it is going to be the impetus for re-examination of the entire field of dental teaching where inefficiencies, overlapping courses, and sheer time-wasting have been not infrequent occurrences. At any rate, those who came to the meeting to criticize the Plan, left holding their tongues.—E. J. R.

Report of Committee on Dental Preparedness of the American Dental Association

THE COMPLETE suspension of appointments in the Dental Reserve Corps has created widespread concern among those who have received this information after having submitted an application for commission with the request for active duty. It is particularly alarming for those subject to immediate draft and all others with low call numbers.

The decision that all dentists now holding reserve commission will be called to active duty for one year, whenever their services are needed, creates a serious situation for many of them. It is equally distressing for dentists of draft age who will be subject to the draft and eventually inducted into the military service as private soldiers and not on a profes-





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sional status. A proper balance in this regard would permit adjustments essential to the welfare of the nation, including sufficient personnel for the needs of the armed forces and the care of the civilian population.

The immediate correction of this situation is absolutely necessary and it is essential that every effort be made by the American Dental Association and its constituents to break down the arbitrary decision to suspend all appointments in the Dental Reserve because an artificial procurement objective has been more than filled to date. At this time, at least fifty dentists have either been inducted or will be called within a short time.

Because of the large number of dentists who now hold reserve commissions and the number of applications pending in the War Department, it seems best to press only for the appointment of those who might be inducted into the service under the Selective Service Law in unprofessional capacities.

The Committee on Dental Preparedness of the American Dental Association and others close to affairs are doing everything possible to bring about a change in the attitude of the War Department, but the Committee is convinced that pressure from the states is absolutely essential if the effort is to succeed. Because this affects medicine and veterinary medicine in like manner, the medical and veterinarian organizations are also active.

It is essential that every dentist whose number is called for induction under the Selective Service Law immediately notify his local Military Affairs Committee of this fact, and, in addition, immediately write or otherwise communicate with his Senators and Representatives requesting the following:

1. That every dentist who receives a low call number from his draft board be authorized to submit an application for a reserve commission, without reference to procurement objectives, and if found qualified, that he be commissioned and ordered to active duty as soon as his services can be utilized.

2. That the War Department provide that those who have failed to submit applications for commission, or whose applications have been suspended or delayed for any reason, and who have already been inducted into the military service, be authorized to submit an application for a reserve commission; also, that every applicant who is qualified both physically and professionally be discharged as a private and immediately commissioned and ordered to active duty under the provisions of his commission.

Recommendations for Temporary Care of Practices of Dentists Called to Active Military Service.

To State Military Affairs Committees, Secretaries of Societies, et al.:

The Committee on Preparedness submits, herewith, the report of its subcommittee (Leuman M. Waugh, New York; J. Ben Robinson, Maryland, and Edward H. Bruening, Nebraska) on recommendations for temporary care of practices of dentists called to active military duty, believing that the suggestions embodied therein can be used by the profession as a basis for a patriotic and equitable protection of the practices of members of the profession who may be serving their country in this time of emergency.

A broad study was made of the numerous and varied plans that were

generally offered. Because of the greatly differing conditions prevailing in various sections of our country, and because of peculiar and personal relations existing in dental practices, it seems impracticable to attempt to recommend definite plans for the care of practices during temporary military service.

The Committee strongly endorses the principle of keeping intact practices of those dentists who are called to active service and who expect to return to their practices as soon as discharged. Local societies are urged to appoint committees to study thoroughly conditions prevailing among their members and recommend plans that promise to be helpful .

In practices sufficiently established, it would seem better to retain the office secretary and have patients continue to come there for dental care. Professional colleagues, by prearrangement, could devote certain hours or days in the private office of the absentee.

Where this is not feasible, the office could be closed temporarily, possibly with the sympathetic cooperation of the landlord, and patients be notified that a specified dentist is temporarily caring for the practice. Lists of referred patients should be kept and these sent back at the end of military activities. They should not be admitted to the practice of the dentist giving temporary care. This is important and an ethical plan should be carefully worked out.

If any specific problems arise in which the committee can be of further assistance, it is suggested that they be presented directly to the chairman of the subcommittee, Leuman M. Waugh, 576 Fifth Avenue, New York, New York.

A Suggestion for Temporary Tenant-Landlord Relations

If the dentist who enters military service wishes to have identical space on his return from service (which is presumed to be within twelve months), he can usually make arrangements to pay one half of the regular monthly rate during such term of service and the space will be held for him. In return for the lower rate, the building manager shall have the privilege of subletting the space to a temporary tenant, in which case the doctor will be relieved of having to pay half of the regular rate, the temporary tenant to be subject to the approval of the lessor. Equipment may be stored elsewhere in the building. For this, a small charge shall be made. Special arrangements will be made in case of leases.

This plan is an agreement signed with a manager of a large office building in Omaha.

DENTAL MEETING

Dates

Kentucky State Dental Association, eighty-first annual meeting, Brown Hotel, Louisville, April 7-9.

•

Alabama Dental Association, seventy-second annual meeting. Tutwiler Hotel, Birmingham, April 8-10.

•

The Old Dominion Dental Society, twenty-eighth annual meeting, Staunton, Virginia, April 14-15.

Sigma Epsilon Delta Fraternity Convention, fortieth anniversary Hotel Pennsylvania, New York City, April 5-6.

•

The American Society for the Advancement of General Anesthesia in Dentistry, regular meeting, Midston House, New York City, March 24.

•

Dallas Mid-Winter Dental Clinic, Hotel Adolphus, Dallas, Texas, April 21-23.

•

Louisiana State Dental Society, sixty-first annual meeting, Hotel Roosevelt, New Orleans, May 1-3.

•

Cleveland Dental Society, annual Spring meeting, Statler Hotel, Cleveland, May 5-7.

•

New Jersey State Dental Association, annual meeting, Berkeley, Carteret Hotel, Asbury Park, May 7-9.

•

Tennessee State Dental Association, seventy-fourth annual meeting, Hotel Andrew Johnson, Knoxville, May 12-15.

•

Illinois State Dental Society, seventy-seventh annual meeting, Pere Marquette Hotel, Peoria, May 12-15.

•

The Dental Society of the State of New York, annual meeting, Hotel Statler, Buffalo, May 13-16.

•

Georgia State Dental Association, seventy-third annual meeting, Hotel DeSoto, Savannah, May 19-21.

•

The Alumni Society of the Philadelphia Dental School, seventy-eighth annual session, Temple University School of Dentistry, May 21-22.

•

Pennsylvania State Dental Society, seventy-third annual meeting, Bedford Springs Hotel, Bedford, June 3-5.

South Dakota State Dental Society, fifty-ninth annual meeting, Alex Johnson Hotel, Rapid City, June 15-17.

•

Mississippi State Dental Association, annual meeting, Buena Vista Hotel, Biloxi, June 9-11.

•

Northeastern Dental Society, twenty-seventh annual convention, New Ocean House, Swampscott, Massachusetts, June 8-11.

•

Utah State Dental Association, fifty-first annual meeting, Salt Lake City, June 26-28.

Montreal Dental Club, seventeenth annual fall clinic, Mount Royal Hotel, Montreal, September 24-26.

•

Florida State Board of Dental Examiners, regular meeting, Jacksonville, June 23-27. Applications must be filed by April 23. For information write to Doctor H. B. Pattishall, 351 St. James Building, Jacksonville.

•

North Dakota State Board of Dental Examiners, regular meeting, Gardner Hotel, Fargo, July 7-10. For infor-

mation write to Doctor L. I. Gilbert, 401 Black Building, Fargo.

•

Ohio State Board of Dental Examiners, regular meeting, Ohio State University, College of Dentistry, the week of June 23. For information write to Doctor M. H. Jones, 1553½ North Fourth Street, Columbus.

•

California State Board of Dental Examiners, regular meeting, Physicians & Surgeons College of Dentistry, San Francisco, week of May 19. Also in Los Angeles at the University of Southern California, week of June 16. For information write to Doctor K. I. Nesbitt, 515 Van Ness Avenue, San Francisco.

•

Mississippi State Board of Dental Examiners, regular meeting, Jackson, June 17. For information write to Doctor G. L. Clement, Pontotoc.

•

Maine State Board of Dental Examiners, regular meeting, State House, Augusta, June 23-25. For information write to Doctor C. W. Maxfield, 31 Central Street, Bangor.

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